ANNEX A

NGS STATE AND COUNTRY CODES

NORTH AMERICAN AND GREENLAND

GREENLAND . . . . . GL

CANADA . . . . . CD

Provinces and Territories:

Alberta	AB	Newfoundland	NF	Prince Edward Is	PE
British Columbia	BC	Northwest Terr's	NW	Quebec	PQ
Manitoba	MB	Nova Scotia	NS	Saskatchewan	SK
New Brunswick	NB	Ontario	ON	Yukon Territory	YK

UNITED STATES . . . . . US

States and District of Columbia:

Alabama	AL	Kentucky	KY	North Dakota	ND
Alaska	AK	Louisiana	LA	Ohio	OH
Arizona	AZ	Maine	ME	Oklahoma	OK
Arkansas	AR	Maryland	MD	Oregon	OR
California	CA	Massachusetts	MA	Pennsylvania	PA
Colorado	CO	Michigan	MI	Rhode Island	RI
Connecticut	CT	Minnesota	MN	**South Carolina**	**SC**
Delaware	DE	Mississippi	MS	South Dakota	SD
Dist of Columbia	DC	Missouri	MO	Tennessee	TN
Florida	FL	Montana	MT	Texas	TX
Georgia	GA	Nebraska	NE	Utah	UT
Hawaii	HI	Nevada	NV	Vermont	VT
Idaho	ID	New Hampshire	NH	Virginia	VA
Illinois	IL	New Jersey	NJ	Washington	WA
Indiana	IN	New Mexico	NM	West Virginia	WV
Iowa	IA	New York	NY	Wisconsin	WI
Kansas	KS	North Carolina	NC	Wyoming	WY

Other Political Units and Territories:

American Samoa	AS	Navassa Island	BQ
Federated States of Micronesia	**FM**	**Northern Mariana Islands**	**CQ**
Guam	GU	Puerto Rico	PR
Johnston Atoll	JQ	Trust Terr of Pacific Islands	TQ
Midway Islands	MQ	**Virgin Islands (US)**	**VQ**
		Wake Island	WQ

BERMUDA . . . . . BD

MEXICO . . . . . MX

CENTRAL AMERICA AND THE CARIBBEAN AREA

ANGUILLA	**AV**	HAITI	HA
ANTIGUA AND BARBUDA	**AC**	HONDURAS	HO
ARUBA	**AA**	JAMAICA	JM
BAHAMA ISLANDS	**BF**	**MARTINIQUE**	**MR**
BARBADOS	BB	**MONTSERRAT**	**MH**
BELIZE (British Honduras)	BH	**NETHERLANDS ANTILLES**	**NT**
BRITISH VIRGIN ISLANDS	**VI**	NICARAGUA	NI
CAYMAN ISLANDS	CJ	PANAMA	PN
COLOMBIA	CB	**ST KITTS AND NEVIS**	**SN**
COSTA RICA	CR	**ST LUCIA**	**ST**
CUBA	CU	**ST MARTIN**	**SJ**
CURACAO	**CP**	**ST VINCENT AND GRENADINES**	**VC**
DOMINICA	**DO**	TRINIDAD AND TOBAGO	TD
DOMINICAN REPUBLIC	DR	**TURKS AND CAICOS ISLANDS**	**TK**
EL SALVADOR	ES		
GRENADA	**GJ**		
GUADELOUPE	**GP**		
GUATEMALA	GT		
GUYANA	**GY**		

OTHER COUNTRIES OR AREAS OF INTEREST TO NGS

ANTARCTICA	AY	PARAGUAY	PY
ARGENTINA	AJ	PHILIPPINE ISLANDS	RP
BOLIVIA	BL	ROMANIA	RO
BRAZIL	BR	SAINT HELENA ISLANDS	SH
CENTRAL AFRICAN REPUBLIC	CF	SAUDI ARABIA	SA
CHILE	CI	SOMALIA	SO
ECUADOR	EC	SOUTH AFRICA	SF
EGYPT	EG	SOVIET UNION	UR
ETHIOPIA	ET	SUDAN	SU
FRENCH GUIANA	FG	SURINAM	SR
GERMANY	GM	SWEDEN	SW
ICELAND	IC	TANZANIA	TZ
ITALY	IT	UGANDA	UG
JAPAN	JA	UNITED KINGDOM	UK
NORWAY	NO	URUGUAY	UY
		VENEZUELA	VE
		ZAMBIA	ZA

NOTE: After this revision of Annex A, NGS will discontinue publishing hard copy updates. Current NGS STATE AND COUNTRY CODES can be retrieved from the NGS Web Site at: [http://www.ngs.noaa.gov/cgi-bin/get-country.prl].

ANNEX B

STATE PLANE COORDINATES (SPC) ZONE CODES

SPC	ZONE	CODE
AL	E	0101
	W	0102
AK	1	5001
	2	5002
	3	5003
	4	5004
	5	5005
	6	5006
	7	5007
	8	5008
	9	5009
	10	5010
AZ	E	0201
	C	0202
	W	0203
AR	N	0301
	S	0302
CA	1	0401
	2	0402
	3	0403
	4	0404
	5	0405
	6	0406
CO	N	0501
	C	0502
	S	0503
CT		0600
DE		0700
FL	E	0901
	W	0902
	N	0903
GA	E	1001
	W	1002
HI	1	5101
	2	5102
	3	5103
	4	5104
	5	5105
ID	E	1101
	C	1102
	W	1103
IL	E	1201
	W	1202
IN	E	1301
	W	1302
IA	N	1401
	S	1402
KS	N	1501
	S	1502
KY	N	1601
	S	1602
LA	N	1701
	S	1702
	SH	1703
ME	E	1801
	W	1802
MD		1900
MA	M	2001
	I	2002
MI	N	2111
	C	2112
	S	2113
MN	N	2201
	C	2202
	S	2203
MS	E	2301
	W	2302
MO	E	2401
	C	2402
	W	2403
MT		2500
NE		2600
NV	E	2701
	C	2702
	W	2703
NH		2800
NJ		2900
NM	E	3001
	C	3002
	W	3003
NY	E	3101
	C	3102
	W	3103
	L	3104
NC		3200
ND	N	3301
	S	3302
OH	N	3401
	S	3402

SPC	ZONE	CODE
OK	N	3501
	S	3502
OR	N	3601
	S	3602
PA	N	3701
	S	3702
RI		3800
SC		3900
SD	N	4001
	S	4002
TN		4100
TX	N	4201
	NC	4202
	C	4203
	SC	4204
	S	4205
UT	N	4301
	C	4302
	S	4303
VT		4400
VA	N	4501
	S	4502
WA	N	4601
	S	4602
WV	N	4701
	S	4702
WI	N	4801
	C	4802
	S	4803
WY	E	4901
	EC	4902
	WC	4903
	W	4904
PR & VI		5200
	AS	5300
	GU	5400

LEGEND:

C - Central Zone
E - Eastern Zone
L - Long Island Zone (NY)
M - Mainland Zone (MA)
N - Northern Zone
NC - North-Central Zone(TX)
SH - Offshore Zone (LA)
S - Southern Zone
SC - South-Central Zone (TX)
W - Western Zone
I - Island (MA)

Note: A blank in the zone columns above indicates that the state has only one state plane coordinate zone.

ANNEX C
CONTRIBUTORS OF GEODETIC CONTROL DATA

This ANNEX contains a list of organizations which have contributed (or are expected to contribute) data resulting from geodetic control established to extend and/or densify the national horizontal and vertical geodetic control networks.

A unique six-character identification **symbol** has been assigned to each organization listed. As far as possible, this symbol is identical to the commonly used abbreviation or acronym of the respective organization. However, to ensure uniqueness, modifications of the commonly used abbreviations and acronyms, as well as arbitrary symbols, had to be assigned in many cases. Organizations not listed in this ANNEX may contact the National Geodetic Survey (see ANNEX K) to have a unique identification symbol assigned.

The respective organizations are grouped under 13 categories, and within each category they are listed in the alphabetic order of their identification symbols. The 13 categories are given in the index below.

CATEGORIES OF CONTRIBUTORS OF GEODETIC CONTROL DATA — PAGE

CONVENTIONS USED IN THE FORMATION OF IDENTIFICATION SYMBOLS

a. State, Province, Commonwealth, and Territorial Agencies: The six-character identification symbol of a state, province, commonwealth, or territorial agency consists of the respective two-character state code (see ANNEX A) to which up to four letters (e.g. the initials of the agency's name) may be appended. In general, "S" for "state" and "0" for "of" should be omitted.

b. County Agencies: The six-character identification symbol of a county agency consists of the two-character code denoting the state in which the county is located (see ANNEX A) followed by a hyphen and by a three-digit number which has been assigned to the respective county in Worldwide Geographic Location Codes prepared by the Office of Finance, General Services Administration (GSA), September 1987. Agencies which do not have access to this publication may contact the National Geodetic Survey (see ANNEX K) to obtain the appropriate county code.

c. City Agencies: The six-character identification symbol of a city agency consists of the two-character code denoting the state in which the city is located (see ANNEX A) followed by a four-digit number which has been assigned to the respective city in Worldwide Geographic Location Codes prepared by the Office of Finance, General Services Administration (GSA), September 1987. Agencies which do not have access to this publication may contact the National Geodetic Survey (see ANNEX K) to obtain the appropriate city code.

NOTE: For the purposes of this ANNEX, agencies of independent cities which are also counties or county-equivalents should be considered to be city (rather than county) agencies and assigned identification symbols accordingly.

64444444444444444444444444444444444444444444444444444444444444447
5NOTE : AGENCY SYMBOLS LISTED HEREIN ARE FOR NGS INTERNAL USE ONLY5
94444444444444444444444444444444444444444444444444444444444444448

NATIONAL AGENCIES

SYMBOL	FULL NAME
AEC	ATOMIC ENERGY COMMISSION (NOW ERDA)
AMS	US ARMY MAP SERVICE (NOW DMA)
ARUBSD	ARUBA SURVEY DEPARTMENT
ASSUR	AMERICAN SAMOA SURVEY
ATSM	APPALACHIAN NATIONAL SCENIC TRAIL SURVEY MARKER
AVDLAS	ANGUILLA DEPARTMENT OF LANDS AND SURVEYS
BBDLAS	STATE OF BARBADOS DIVISION OF LANDS AND SURVEYS
BLM	US BUREAU OF LAND MANAGEMENT
BOF	US BUREAU OF COMMERCIAL FISHERIES
BOM	US BUREAU OF MINES
BOR	US BUREAU OF RECLAMATION (NOW WPRS)
BPR	US BUREAU OF PUBLIC ROADS
BSDLAS	BAHAMAS DEPARTMENT OF LANDS AND SURVEYS
BV	BRITISH VIRGIN ISLAND
CAB	CIVIL AERONAUTICS BOARD
CGD	CURACAO GEODETIC DEPARTMENT
CGS	US COAST AND GEODETIC SURVEY (NOW NOS)
CHS	CANADIAN HYDROGRAPHIC SERVICE
CIHD	CAYMAN ISLAND HYDROGRAPHIC
CLAS	CAYMAN LANDS AND SURVEYS DEPARTMENT
COD	CENTER FOR ORBIT DETERMINATION
CO-OPS	CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES
DI	US DEPARTMENT OF INTERIOR
DMA	DEFENSE MAPPING AGENCY (NOW NIMA)
DOD	US DEPARTMENT OF DEFENSE
DOE	DEPARTMENT OF ENERGY
DRN	DOMINICAN REPUBLIC NAVY
DTENAL	ESTUDIOS DEL TERRITORIO NACIONAL DE MEXICO
EMR	ENERGY MINES AND RESOURCES
EPA	ENVIRONMENTAL PROTECTION AGENCY
ES-IGN	EL SALVADOR-INST GEOG NAC
FAA	FEDERAL AVIATION ADMINISTRATION
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FHWA	FEDERAL HIGHWAY ADMINISTRATION
GDS	GRENADA DEPARTMENT OF SURVEYS
GSC	GEODETIC SURVEY OF CANADA
GSFC	GODDARD SPACE FLIGHT CENTER
GU	TERRITORY OF GUAM
GUAA	GUAM AIRPORT AUTHORITY
GUGS	GUAM GEODETIC SURVEY
GYANA	GUYANA DIRECTORATE OF OVERSEAS SURVEYS
GYTHD	GUYANA TRANSPORT AND HIGHWAYS DEPARTMENT
IAGS	INTER-AMERICAN GEODETIC SURVEY
IAMAP	INTERNATIONAL AERIAL MAPPING

NATIONAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
IBC	INTERNATIONAL BOUNDARY COMMISSION
IBWC	INTERNATIONAL BOUNDARY AND WATER COMMISSION
INEGI	INSTITUTO NACIONAL DE ESTADISTICA GI DE MEXICO
ISTS	INTERNATIONAL SATELLITE TRIANGULATION STATION
IWC	INTERNATIONAL WATERWAYS COMMISSION
JSD	JAMAICA SURVEY DEPARTMENT
MCIDR	MILITARY CARTOGRAPHIC INSTITUTE OF THE DOMINICAN REPUBLIC
NASA	NATIONAL AERONAUTICS AND SPACE ADMIN
NBS	NATIONAL BUREAU OF STANDARDS (NOW NIST)
NGS	NATIONAL GEODETIC SURVEY
NHANG	NEW HAMPSHIRE AIR NATIONAL GUARD
NIH	NATIONAL INSTITUTES OF HEALTH
NIMA	NATIONAL IMAGERY AND MAPPING AGENCY
NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOS	NATIONAL OCEAN SURVEY (NOW NATIONAL OCEAN SERVICE)
NOSAMC	NOS ATLANTIC MARINE CENTER
NOSOES	NOS OFFICE OF OCEAN AND EARTH SCIENCES (NOW NOSOPS)
NOSOMA	NOS OCEANOGRAPHY AND MARINE ASSESSMENT
NOSOPS	NOS OCEANOGRAPHIC PRODUCTS AND SERVICES DIVISION
NOSPMC	NOS PACIFIC MARINE CENTER
NPS	NATIONAL PARK SERVICE
NRCS	NATURAL RESOURCES CONSERVATION SERVICE
NSL	US NAVY STANDARDS LABORATORY AT POMONA
NWS	NATIONAL WEATHER SERVICE
ONCADH	ONTARIO CANADA DEPARTMENT OF HIGHWAYS
PBPP	OFFICE OF PUBLIC BUILDINGS AND PUBLIC PARKS
PICGS	PHILIPPINE COAST AND GEODETIC SURVEY
SCS	SOIL CONSERVATION SERVICE (NOW NRCS)
SDS	SURINAM DEPARTMENT OF SURVEYS
SKDS	ST KITTS DEPARTMENT OF SURVEYS
SLDS	ST LUCIA DEPARTMENT OF SURVEYS
SMSO	ST MARTIN SURVEYING OFFICE
SVDS	ST VINCENT DEPARTMENT OF SURVEYS
SWEDLS	SWEDISH LAND SURVEY
TDLAS	TRINIDAD DEPARTMENT OF LANDS AND SURVEYS
TLAS	TOBAGO LANDS AND SURVEYS
YNM	TOBAGO NAUTICAL MAPPING
TPC	US ARMY TOPOGRAPHIC COMMAND (NOW DMA)
TQDLM	TRUST TERRITORY OF PACIFIC ISLANDS DIVISION OF LAND MANAGEMENT
TVA	TENNESSEE VALLEY AUTHORITY
UKRE	UNITED KINGDOM ROYAL ENGINEERS
USA	US ARMY
USAF	US AIR FORCE
USAFGS	US AIR FORCE 1381ST GEODETIC SURVEY SQUADRON
USCG	US COAST GUARD
USDA	US DEPARTMENT OF AGRICULTURE
USDOT	US DEPARTMENT OF TRANSPORTATION
USDWC	US DEEP WATERWAY COMMISSION
USE	US ARMY CORPS OF ENGINEERS
USFS	US FOREST SERVICE

NATIONAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
USFWA	US FEDERAL WORKS AGENCY
USFWS	US FISH AND WILDLIFE SERVICE
USGLO	US GOVERNMENT LAND OFFICE
USGS	US GEOLOGICAL SURVEY
USGS-E	USGS EASTERN MAPPING CENTER
USGS-M	USGS MID-CONTINENT MAPPING CENTER
USGS-R	USGS ROCKY MOUNTAIN MAPPING CENTER
USGS-W	USGS WESTERN MAPPING CENTER
USIIS	US INDIAN IRRIGATION SERVICE
USLHS	US LIGHTHOUSE SERVICE (NOW USCG)
USLS	US LAKE SURVEY
USMC	US MARINE CORPS
USN	US NAVY
USPS	US POSTAL SERVICE
USSC	US SUPREME COURT
USSES	US SOIL EROSION SERVICE
USTD	US TREASURY DEPARTMENT
USWB	US WEATHER BUREAU (NOW NWS)
VI	VIRGIN ISLANDS (US)
VICS	VIRGIN ISLANDS CADASTRAL SURVEY
WPA	WORKS PROGRESS ADMINISTRATION
WPRS	US WATER AND POWER RESOURCES SERVICE
WSMR	WHITE SANDS MISSILE RANGE
YAP	YAP STATE

INTER-STATE OR INTER-PROVINCE AGENCIES

SYMBOL	FULL NAME
BPA	BONNEVILLE POWER ADMINISTRATION
CGS+SS	US COAST AND GEODETIC SURVEY AND STATE SURVEY
DEPABC	DELAWARE-PENNSYLVANIA BOUNDARY COMMISSION
IRC	ILLINOIS RIVER COMMISSION
MANHBC	MASSACHUSETTS-NEW HAMPSHIRE BOUNDARY COMMISSION
MDDEBC	MARYLAND-DELAWARE BOUNDARY COMMISSION
MDVABC	MARYLAND-VIRGINIA BOUNDARY COMMISSION
MENHBC	MAINE-NEW HAMPSHIRE BOUNDARY COMMISSION
MORC	MISSOURI RIVER COMMISSION
MRC	MISSISSIPPI RIVER COMMISSION
NCSCSB	NORTH CAROLINA-SOUTH CAROLINA STATE BOUNDARY LINE
NGS+SS	NATIONAL GEODETIC SURVEY AND STATE SURVEY
NMTXBC	NEW MEXICO AND TEXAS BOUNDARY COMMISSION
OHMI	OHIO-MICHIGAN BOUNDARY COMMISSION
VTNHBC	VERMONT-NEW HAMPSHIRE BOUNDARY COMMISSION

STATE, PROVINCE, COMMONWEALTH, AND TERRITORIAL AGENCIES

SYMBOL	FULL NAME
AKDAVI	ALASKA DIVISION OF AVIATION
AKDLS	ALASKA DIVISION OF LAND SURVEY
AKDNR	ALASKA DEPARTMENT OF NATURAL RESOURCES
AKDT	ALASKA DEPARTMENT OF TRANSPORTATION
AKHD	ALASKA HIGHWAY DEPARTMENT
AKPWR	ALASKA POWER ADMINISTRATION
ALGS	ALABAMA GEODETIC SURVEY
ALHD	STATE OF ALABAMA HIGHWAY DEPARTMENT
ARGLS	ARKANSAS GEOLOGICAL SURVEY
ARGS	ARKANSAS GEODETIC SURVEY
ARHD	ARKANSAS STATE HIGHWAY DEPARTMENT
AZDT	ARIZONA DEPARTMENT OF TRANSPORTATION
AZHD	ARIZONA HIGHWAY DEPARTMENT (NOW AZDT)
CADC	CALIFORNIA DEPARTMENT OF CONSERVATION
CADF	CALIFORNIA DIVISION OF FORESTRY
CADH	CALIFORNIA DIVISION OF HIGHWAYS (NOW CADT)
CADPW	CALIFORNIA DEPARTMENT OF PUBLIC WORKS
CADT	CALIFORNIA DEPARTMENT OF TRANSPORTATION
CADWR	CALIFORNIA DEPARTMENT OF WATER RESOURCES
CAEC	CALIFORNIA EARTHQUAKE COMMISSION
CAGS	CALIFORNIA GEODETIC SURVEY
CASLC	CALIFORNIA STATE LANDS COMMISSION
CASPC	CALIFORNIA STATE PARKS COMMISSION
CODH	COLORADO STATE DEPARTMENT OF HIGHWAYS
CODOT	COLORADO DEPARTMENT OF TRANSPORTATION
COGS	COLORADO GEODETIC SURVEY
COWCD	COLORADO WATER CONSERVATION DEPARTMANT
CTCSF	CONNECTICUT COMMISSION OF SHELL FISHERIES
CTDT	CONNECTICUT DEPARTMENT OF TRANSPORTATION
CTDTGS	DEPARTMENT OF TRANSPORTATION GEODETIC SURVEYS
CTGS	CONNECTICUT GEODETIC SURVEY
DCDHT	DC DEPARTMENT OF HIGHWAYS AND TRAFFIC
DEDHT	DELAWARE DEPARTMENT OF HIGHWAYS AND TRANSP
DEGS	DELAWARE GEOLOGICAL SURVEY
FLAA	FLORIDA AVIATION AUTHORITY
FLCSFC	CENTRAL SOUTH FLORIDA FLOOD CONTROL DISTRICT
FLDACS	FLORIDA DEPARTMENT OF AGR AND CONSUMER SERV
FLDEP	FLORIDA DEPARTMENT OF ENVIROMENTAL PROTECTION
FLDNR	FLORIDA DEPARTMENT OF NATURAL RESOURCES (FLDEP)
FLDPW	FLORIDA DEPARTMENT OF PUBLIC WORKS
FLDT	FLORIDA DEPARTMENT OF TRANSPORTATION
FLGS	FLORIDA GEODETIC SURVEY
FLHD	FLORIDA HIGHWAY DEPARTMENT (NOW FLDT)
FLSRD	FLORIDA STATE ROAD DEPARTMENT
GACON	GEORGIA CONSORTIUM
GADT	GEORGIA DEPARTMENT OF TRANSPORTATION
GAGS	GEORGIA GEODETIC SURVEY
GAHD	GEORGIA HIGHWAY DEPARTMENT (NOW GADT)
HI	STATE OF HAWAII
HIDT	HAWAII DEPARTMENT OF TRANSPORTATION
HIGS	HAWAII GEODETIC SURVEY
HITS	HAWAII TERRITORIAL SURVEY

STATE, PROVINCE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
IACC	IOWA CONSERVATION COMMISSION
IADT	IOWA DEPARTMENT OF TRANSPORTATION
IAHD	IOWA HIGHWAY DEPARTMENT
IDDH	IDAHO DEPARTMENT OF HIGHWAYS (NOW IDDT)
IDDT	IDAHO DEPARTMENT OF TRANSPORTATION (NOW IDTD)
IDGS	IDAHO GEODETIC SURVEY
IDPWD	IDAHO DEPARTMENT OF PUBLIC WORKS
IDTD	IDAHO TRANSPORTATION DEPARTMENT
ILDPW	ILLINOIS DEPARTMENT OF PUBLIC WORKS
ILDT	ILLINOIS DEPARTMENT OF TRANSPORTATION
ILDW	ILLINOIS DIVISION OF WATERWAYS
ILGS	ILLINOIS GEODETIC SURVEY
ILHD	ILLINOIS HIGHWAY DEPARTMENT (NOW ILDT)
ILSC	ILLINOIS SANITARY COMMISSION
ILSTHA	ILLINOIS STATE TOLL HIGHWAY AUTHORITY
INCS	INDIANA COUNTY SURVEYOR
INDNR	INDIANA DEPARTMENT OF NATURAL RESOURCES
INDOT	INDIANA DEPARTMENT OF TRANSPORTATION
INFCC	INDIANA FLOOD CONTROL AND WATER RES COMM
INGS	INDIANA GEODETIC SURVEY
INHD	INDIANA HIGHWAY DEPARTMENT
IOWAGS	IOWA GEODETIC SURVEY
KSDT	KANSAS DEPARTMENT OF TRANSPORTATION
KSGS	KANSAS GEODETIC SURVEY
KSHC	STATE HIGHWAY COMM OF KANSAS (NOW KSDT)
KSWRB	KANSAS WATER RESOURCES BOARD
KYDT	KENTUCKY DEPARTMENT OF TRANSPORTATION
KYGS	KENTUCKY GEODETIC SURVEY
KYHD	KENTUCKY STATE HIGHWAY DEPARTMENT (NOW KYDT)
LADH	LOUISIANA DEPARTMENT OF HIGHWAYS (NOW LADTD)
LADHGS	LOUISIANA DEPARTMENT OF HIGHWAYS AND CGS
LADPW	LOUISIANA DEPARTMENT OF PUBLIC WORKS
LADTD	LOUISIANA DEPT OF TRANSP AND DEVELOPMENT
LAGS	LOUISIANA GEODETIC SURVEY
LASCC	LOUISIANA STATE CONSERVATION COMMISSION
MADLH	MASSACHUSETTS DEPARTMENT OF LAND AND HARBORS
MADPW	MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS
MAGS	MASSACHUSETTS GEODETIC SURVEY
MAHWY	MASSACHUSETTS HIGHWAY DEPARTMENT
MALCT	MASSACHUSETTS LAND COURT
MDBCSM	MARYLAND BUREAU OF CONTROL SURVEYS AND MAPS
MDDNR	MARYLAND DEPARTMENT OF NATURAL RESOURCES
MDDT	MARYLAND DEPARTMENT OF TRANSPORTATION
MDDTS	MARYLAND DEPARTMENT OF TRANSPORTATION SURVEY
MDGS	MARYLAND GEODETIC SURVEY
MDSFC	MARYLAND SHELL FISHERIES COMMISSION
MDSHA	MARYLAND DOT STATE HIGHWAY ADMINISTRATION
MDSRC	MARYLAND STATE ROADS COMMISSION (NOW MDDT)
MEDT	MAINE DEPARTMENT OF TRANSPORTATION
MEGS	MAINE GEODETIC SURVEY
MEHD	MAINE HIGHWAY DEPARTMENT (NOW MEDT)
MEPUC	MAINE PUBLIC UTILITIES COMMISSION

STATE, PROVINCE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
MIDH	MICHIGAN DEPT OF STATE HIGHWAYS AND TRANSP
MIDNR	MICHIGAN DEPARTMENT OF NATURAL RESOURCES
MIDT	MICHIGAN DEPARTMENT OF TRANSPORTATION
MIGS	MICHIGAN GEODETIC SURVEY
MNDNR	MINNESOTA DEPARTMENT OF NATURAL RESOURCES
MNDT	MINNESOTA DEPARTMENT OF TRANSPORTATION
MNGS	MINNESOTA GEODETIC SURVEY
MNHD	MINNESOTA HIGHWAY DEPARTMENT (NOW MNDT)
MODNR	MISSOURI DEPARTMENT OF NATURAL RESOURCES
MOGS	MISSOURI GEODETIC SURVEY
MOHC	MISSOURI STATE HIGHWAY COMMISSION
MOSLSA	MISSOURI STATE LAND SURVEY AUTHORITY
MSDEQ	MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MSDOT	MISSISSIPPI DEPARTMENT OF TRANSPORTATION
MSGS	MISSISSIPPI GEODETIC SURVEY
MSHD	MISSISSIPPI STATE HIGHWAY DEPARTMENT
MTBOR	MONTANA BUREAU OF PUBLIC ROADS
MTDH	MONTANA DEPARTMENT OF HIGHWAYS
MTDOT	MONTANA DEPARTMENT OF TRANSPORTATION
MTGS	MONTANA GEODETIC SURVEY
MTSHC	MONTANA STATE HIGHWAY COMMISSION
NCDF	NORTH CAROLINA DIVISION OF FORESTRY
NCDNR	NORTH CAROLINA DEPT OF NATURAL RESOURCES
NCDOA	NORTH CAROLINA DEPARTMENT OF AGRICULTURE
NCDOT	NORTH CAROLINA DEPT OF TRANS DIV OF HWYS
NCGS	NORTH CAROLINA GEODETIC SURVEY
NCHC	NORTH CAROLINA HIGHWAY COMMISSION (NOW NCDOT)
NCHPWC	NORTH CAROLINA HIGHWAY AND PUBLIC WORKS COMM
NCSHC	NORTH CAROLINA STATE HIGHWAY COMMISSION
NDGS	NORTH DAKOTA GEODETIC SURVEY
NDHD	NORTH DAKOTA HIGHWAY DEPARTMENT
NDWC	NORTH DAKOTA WATER COMMISSION
NEDR	NEBRASKA DEPARTMENT OF ROADS
NEGS	NEBRASKA GEODETIC SURVEY
NEPPD	NEBRASKA PUBLIC POWER DISTRICT
NHDOT	NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
NHDPWH	NEW HAMPSHIRE DEPT OF PUBLIC WORKS + HWYS
NHGS	NEW HAMPSHIRE GEODETIC SURVEY
NHHD	NEW HAMPSHIRE HIGHWAY DEPARTMENT
NJBCN	NEW JERSEY BOARD OF COMMERCE AND NAVIGATION
NJDCED	NEW JERSEY DEPARTMENT OF CONSERVATION AND ECON DEV
NJDEP	NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
NJDT	NEW JERSEY DEPARTMENT OF TRANSPORTATION
NJGS	NEW JERSEY GEODETIC SURVEY
NJHA	NEW JERSEY HIGHWAY AUTHORITY
NJSFC	NEW JERSEY SHELL FISHERIES COMMISSION
NMGS	NEW MEXICO GEODETIC SURVEY
NMHC	NEW MEXICO STATE HIGHWAY COMMISSION
NMHD	NEW MEXICO STATE HIGHWAY DEPARTMENT
NVBMG	NEVADA BUREAU OF MINES AND GEOLOGY
NVDH	NEVADA DEPARTMENT OF HIGHWAYS

STATE, PROVINCE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
NVDT	NEVADA DEPARTMENT OF TRANSPORTATION
NVGS	NEVADA GEODETIC SURVEY
NYBE+A	NEW YORK BOARD OF ESTIMATE AND APPORTIONMENT
NYDPW	NEW YORK STATE DEPARTMENT OF PUBLIC WORKS
NYDT	NEW YORK STATE DEPARTMENT OF TRANSPORTATION
NYGS	NEW YORK GEODETIC SURVEY
NYHD	NEW YORK DEPARTMENT OF HIGHWAYS (NOW NYDT)
NYLISP	NEW YORK LONG ISLAND STATE PARK AUTHORITY
NYNPA	NEW YORK NIAGARA POWER AUTHORITY
NYSE+S	NEW YORK STATE ENGINEER AND SURVEYOR
NYSS	NEW YORK STATE SURVEY
OHDNR	OHIO DEPARTMENT OF NATURAL RESOURCES
OHDT	OHIO DEPARTMENT OF TRANSPORTATION
OHGS	OHIO GEODETIC SURVEY
OHHD	OHIO HIGHWAY DEPARTMENT (NOW OHDT)
OHPLS	PROF LAND SURVEYORS OF OHIO
OKCC	OKLAHOMA CONSERVATION COMMISSION
OKDH	OKLAHOMA DEPARTMENT OF HIGHWAYS
OKDOT	OKLAHOMA DEPARTMENT OF TRANSPORTATION
OKGS	OKLAHOMA GEODETIC SURVEY
ORDT	OREGON DEPARTMENT OF TRANSPORTATION
ORGS	OREGON GEODETIC SURVEY
ORHD	OREGON STATE HIGHWAY DEPARTMENT (NOW ORDT)
ORSLB	OREGON STATE LAND BOARD
ORTAX	OREGON STATE TAX COMMISSION
PADFW	PENNSYLVANIA DEPT OF FORESTS AND WATERS
PADH	PENNSYLVANIA DEPT OF HIGHWAYS (NOW PADT)
PADT	PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
PAGS	PENNSYLVANIA GEODETIC SURVEY
PATUCO	PENNSYLVANIA TURNPIKE COMMISSION
PRPWD	PUERTO RICO PUBLIC WORKS DEPARTMENT
RIBPR	RHODE ISLAND BUREAU OF PUBLIC ROADS
RIDT	RHODE ISLAND DEPARTMENT OF TRANSPORTATION
RIGS	RHODE ISLAND GEODETIC SURVEY
SCCC	SOUTH CAROLINA COASTAL COUNCIL
SCDHPT	SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
SCDNR	SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
SCDOT	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
SCGS	SOUTH CAROLINA GEODETIC SURVEY
SCHD	SOUTH CAROLINA STATE HIGHWAY DEPARTMENT
SCWRC	SOUTH CAROLINA WATER RESOURCE COMMISSION
SDDT	SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
SDGS	SOUTH DAKOTA GEODETIC SURVEY
SDHD	SOUTH DAKOTA HIGHWAY DEPARTMENT (NOW SDDT)
TNDG	TENNESSEE DIVISION OF GEOLOGY
TNDPW	TENNESSEE DEPARTMENT OF PUBLIC WORKS
TNDT	TENNESSEE DEPARTMENT OF TRANSPORTATION
TNGS	TENNESSEE GEODETIC SURVEY
TNHD	TENNESSEE HIGHWAY DEPARTMENT (NOW TNDT)
TXDOT	TEXAS DEPARTMENT OF TRANSPORTATION
TXAC	TEXAS AERONAUTICS COMMISSION
TXGS	TEXAS GEODETIC SURVEY
TXHD	TEXAS HIGHWAY DEPARTMENT

STATE, PROVINCE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	FULL NAME
TXRD	TEXAS RECLAMATION DEPARTMENT
UTDH	UTAH STATE DEPARTMENT OF HIGHWAYS
VACF	VIRGINIA COMMISSION OF FISHERIES
VADH	VIRGINIA DEPARTMENT OF HIGHWAYS
VADHT	VIRGINIA DEPT OF HIGHWAYS AND TRANSPORTATION
VAGS	VIRGINIA GEODETIC SURVEY
VAMR	VIRGINIA MARINE RESOURCES
VTANR	VERMONT AGENCY OF NATURAL RESOURCES
VTAT	VERMONT AGENCY OF TRANSPORTATION
VTDH	VERMONT DEPARTMENT OF HIGHWAYS (NOW VTAT)
VTFS	VERMONT FOREST SERVICE
VTGS	VERMONT GEODETIC SURVEY
VTHP	VERMONT HISTORIC PRESERVATION
VTMP	VERMONT MAPPING PROGRAM
VTSM	STATE OF VERMONT SURVEY MARK
WADECO	WASHINGTON DEPARTMENT OF ECOLOGY
WADNR	WASHINGTON DEPARTMENT OF NATURAL RESOURCES
WADECO	WASHINGTON DEPARTMENT OF ECOLOGY
WADPL	WASHINGTON STATE DEPARTMENT OF PUBLIC LANDS
WADPW	WASHINGTON DEPARTMENT OF PUBLIC WORKS
WADT	WASHINGTON DEPARTMENT OF TRANSPORTATION
WAGS	WASHINGTON GEODETIC SURVEY
WAHC	WASHINGTON STATE HIGHWAY COMMISSION
WATBA	WASHINGTON STATE TOLL BRIDGE AUTHORITY
WIDNR	WISCONSIN DEPARTMENT OF NATURAL RESOURCES
WIDT	WISCONSIN DEPARTMENT OF TRANSPORTATION
WIGS	WISCONSIN GEODETIC SURVEY
WIHD	WISCONSIN HIGHWAY DEPARTMENT (NOW WIDT)
WIPSC	WISCONSIN PUBLIC SERVICE COMMISSION
WIRRC	WISCONSIN RAILROAD COMMISSION
WVDT	WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
WVGS	WEST VIRGINIA GEODETIC SURVEY
WVHD	WEST VIRGINIA HIGHWAY DEPARTMENT
WYDT	WYOMING DEPARTMENT OF TRANSPORTATION
WYGS	WYOMING GEODETIC SURVEY
WYHD	WYOMING HIGHWAY DEPARTMENT (NOW WYDT)
WYPLS	WYOMING PROFESSIONAL LAND SURVEYOR

SYMBOL	FULL NAME
AK-013	ALEUTIANS EAST BOROUGH
AK-016	ALEUTIANS WEST CENSUS AREA
AK-020	MUNICIPALITY OF ANCHORAGE
AK-050	BETHEL CENSUS AREA
AK-060	BRISTOL BAY BOROUGH
AK-068	DENALI BOROUGH
AK-070	DILLINGHAM CENSUS AREA
AK-090	FAIRBANKS NORTH STAR BOROUGH
AK-100	HAINES BOROUGH
AK0110	JUNEAU BOROUGH
AK-122	KENAI PENINSULA BOROUGH
AK-130	KETCHIKAN GATEWAY BOROUGH
AK-150	KODIAK ISLAND BOROUGH
AK-164	LAKE AND PENINSULA BOROUGH
AK-170	MATANUSKA-SUSITNA BOROUGH
AK-180	NOME CENSUS AREA
AK-185	NORTH SLOPE BOROUGH
AK-188	NORTHWEST ARCTIC BOROUGH
AK-201	PRINCE OF WALES-OUTER KETCHIKAN CENSUS AREA
AK-220	SITKA BOROUGH
AK-232	SKAGWAY-HOONAH-ANGOON CENSUS AREA
AK-240	SOUTHEAST FAIRBANKS CENSUS AREA
AK-261	VALDEZ-CORDOVA CENSUS AREA
AK-270	WADE HAMPTON CENSUS AREA
AK-280	WRANGELL-PETERSBURG CENSUS AREA
AK-282	YAKUTAT BOROUGH
AK-290	YUKON-KOYUKUK CENSUS AREA
AL-053	ESCAMBIA COUNTY ALABAMA
AL-073	JEFFERSON COUNTY ALABAMA
AL-101	MONTGOMERY COUNTY ALABAMA
AL-107	PICKENS COUNTY ALABAMA
AL-119	SUMTER COUNTY ALABAMA
AR-005	BAXTER COUNTY ARKANSAS
AZ-013	MARICOPA COUNTY ARIZONA
AZ-015	MOHAVE COUNTY ARIZONA
AZ-019	PIMA COUNTY ARIZONA
AZ-021	PINAL COUNTY ARIZONA
AZ-025	YAVAPAI COUNTY ARIZONA
CA-001	ALAMEDA COUNTY CALIFORNIA
CA-007	BUTTE COUNTY CALIFORNIA
CA-013	CONTRA COSTA COUNTY CALIFORNIA
CA-019	FRESNO COUNTY CALIFORNIA
CA-023	HUMBOLDT COUNTY CALIFORNIA
CA-025	IMPERIAL COUNTY CALIFORNIA
CA-027	INYO COUNTY CALIFORNIA
CA-029	KERN COUNTY CALIFORNIA
CA-031	KINGS COUNTY CALIFORNIA
CA-033	LAKE COUNTY CALIFORNIA
CA-037	LOS ANGELES COUNTY CALIFORNIA
CA-041	MARIN COUNTY CALIFORNIA
CA-043	MARIPOSA COUNTY CALIFORNIA
CA-045	MENDOCINO COUNTY CALIFORNIA
CA-051	MONO COUNTY CALIFORNIA
CA-053	MONTEREY COUNTY CALIFORNIA
CA-055	NAPA COUNTY CALIFORNIA
CA-059	ORANGE COUNTY CALIFORNIA
CA-061	PLACER COUNTY CALIFORNIA
CA-063	PLUMAS COUNTY CALIFORNIA

SYMBOL	FULL NAME
CA-065	RIVERSIDE COUNTY CALIFORNIA
CA-067	SACRAMENTO COUNTY CALIFORNIA
CA-069	SAN BENITO COUNTY CALIFORNIA
CA-071	SAN BERNARDINO COUNTY CALIFORNIA
CA-073	SAN DIEGO COUNTY CALIFORNIA
CA-075	SAN FRANCISCO COUNTY CALIFORNIA
CA-077	SAN JOAQUIN COUNTY CALIFORNIA
CA-079	SAN LUIS OBISPO COUNTY CALIFORNIA
CA-081	SAN MATEO COUNTY CALIFORNIA
CA-083	SANTA BARBARA COUNTY CALIFORNIA
CA-085	SANTA CLARA COUNTY CALIFORNIA
CA-087	SANTA CRUZ COUNTY CALIFORNIA
CA-089	SHASTA COUNTY CALIFORNIA
CA-091	SIERRA COUNTY CALIFORNIA
CA-093	SISKIYOU COUNTY CALIFORNIA
CA-095	SOLANO COUNTY CALIFORNIA
CA-097	SONOMA COUNTY CALIFORNIA
CA-099	STANISLAUS COUNTY CALIFORNIA
CA-103	TEHAMA COUNTY CALIFORNIA
CA-105	TRINITY COUNTY CALIFORNIA
CA-107	TULARE COUNTY CALIFORNIA
CA-109	TUOLUMNE COUNTY CALIFORNIA
CA-111	VENTURA COUNTY CALIFORNIA
CA-113	YOLO COUNTY CALIFORNIA
CO-001	ADAMS COUNTY COLORADO
CO-005	ARAPAHOE COUNTY COLORADO
CO-013	BOULDER COUNTY COLORADO
CO-017	CHEYENNE COUNTY COLORADO
CO-037	EAGLE COUNTY COLORADO
CO-059	JEFFERSON COUNTY COLORADO
CO-061	KIOWA COUNTY COLORADO
CO-069	LARIMER COUNTY COLORADO
CO-077	MESA COUNTY COLORADO
CO-087	MORGAN COUNTY COLORADO
CO-101	PUEBLO COUNTY COLORADO
CO-123	WELD COUNTY COLORADO
FL-001	ALACHUA COUNTY FLORIDA
FL-005	BAY COUNTY FLORIDA
FL-009	BREVARD COUNTY FLORIDA
FL-011	BROWARD COUNTY FLORIDA
FL-015	CHARLOTTE COUNTY FLORIDA
FL-017	CITRUS COUNTY FLORIDA
FL-021	COLLIER COUNTY FLORIDA
FL-025	DADE COUNTY FLORIDA
FL-033	ESCAMBIA COUNTY FLORIDA
FL-051	HENDRY COUNTY FLORIDA
FL-053	HERNANDO COUNTY FLORIDA
FL-057	HILLSBOROUGH COUNTY FLORIDA
FL-061	INDIAN RIVER
FL-069	LAKE COUNTY FLORIDA
FL-071	LEE COUNTY FLORIDA
FL-081	MANATEE COUNTY FLORIDA
FL-083	MARION COUNTY FLORIDA
FL-085	MARTIN COUNTY FLORIDA
FL-091	OKALOOSA COUNTY FLORIDA
FL-095	ORANGE COUNTY FLORIDA

SYMBOL	FULL NAME
FL-097	OSCEOLA COUNTY FLORIDA
FL-099	PALM BEACH COUNTY FLORIDA
FL-101	PASCO COUNTY FLORIDA
FL-103	PINELLAS COUNTY FLORIDA
FL-107	PUTNAM COUNTY FLORIDA
FL-109	ST JOHNS COUNTY FLORIDA
FL-111	ST LUCIE COUNTY FLORIDA
FL-113	SANTA ROSA COUNTY FLORIDA
FL-115	SARASOTA COUNTY FLORIDA
FL-117	SEMINOLE COUNTY FLORIDA
FL-131	WALTON COUNTY FLORIDA
GA-067	COBB COUNTY GEORGIA
GA-089	DE KALB COUNTY GEORGIA
GA-095	DOUGHERTY COUNTY GEORGIA
GA-117	FORSYTH COUNTY GEORGIA
GA-121	FULTON COUNTY GEORGIA
GA-135	GWINNETT COUNTY GEORGIA
GA-151	HENRY COUNTY GEORGIA
IA-031	CEDAR COUNTY IOWA
IA-033	CERRO GORDO COUNTY IOWA
IA-035	CHEROKEE COUNTY IOWA
IA-037	CHICKASAW COUNTY IOWA
IA-057	DES MOINES COUNTY IOWA
IA-059	DICKINSON COUNTY IOWA
IA-063	EMMET COUNTY IOWA
IA-065	FAYETTE COUNTY IOWA
IA-077	GUTHRIE COUNTY IOWA
IA-083	HARDIN COUNTY IOWA
IA-105	JONES COUNTY IOWA
IA-113	LINN COUNTY IOWA
IA-119	LYON COUNTY IOWA
IA-125	MARION COUNTY IOWA
IA-147	PALO ALTO COUNTY IOWA
IA-149	PLYMOUTH COUNTY IOWA
IA-159	RINGGOLD COUNTY IOWA
IA-165	SHELBY COUNTY IOWA
IA-167	SIOUX COUNTY IOWA
IA-169	STORY COUNTY IOWA
IA-183	WASHINGTON COUNTY IOWA
ID-011	ADA COUNTY IDAHO
ID-079	SHOSHONE COUNTY IDAHO
IL-031	COOK COUNTY ILLINOIS
IL-043	DU PAGE COUNTY ILLINOIS
IL-051	FAYETTE COUNTY ILLINOIS
IL-103	LEE COUNTY ILLINOIS
IL-125	MADISON COUNTY ILLINOIS
IL-163	ST CLAIR COUNTY ILLINOIS
IL-195	WHITESIDE COUNTY ILLINOIS
IN-003	ALLEN COUNTY INDIANA
IN-039	ELKHART COUNTY INDIANA
IN-057	HAMILTON COUNTY INDIANA
IN-059	HANCOCK COUNTY INDIANA
IN-085	KOSCIUSKO COUNTY INDIANA
IN-097	MARION COUNTY INDIANA
IN-127	PORTER COUNTY INDIANA
IN-131	PULASKI COUNTY INDIANA

SYMBOL	FULL NAME
IN-141	ST JOSEPH COUNTY INDIANA
KS-007	BARBER COUNTY KANSAS
KS-009	BARTON COUNTY KANSAS
KS-167	RUSSELL COUNTY KANSAS
KS-189	STEVENS COUNTY KANSAS
KS-203	WICHITA COUNTY KANSAS
KS-207	WOODSON COUNTY KANSAS
KS-209	WYANDOTTE COUNTY KANSAS
LA-019	CALASIEU PARISH LOUISIANA
LA-033	EAST BATON ROUGE PARISH LOUISIANA
LA-051	JEFFERSON PARISH LOUISIANA
LA-087	ST BERNARD PARISH LOUISIANA
LA-101	ST MARY PARISH LOUISIANA
LA-109	TERREBONNE PARISH LOUISIANA
MD-001	ALLEGANY COUNTY MARYLAND
MD-003	ANNE ARUNDEL COUNTY MARYLAND
MD-005	BALTIMORE COUNTY MARYLAND
MD-013	CARROLL COUNTY MARYLAND
MD-017	CHARLES COUNTY MARYLAND
MD-019	DORCHESTER COUNTY MARYLAND
MD-021	FREDERICK COUNTY MARYLAND
MD-025	HARFORD COUNTY MARYLAND
MD-027	HOWARD COUNTY MARYLAND
MD-037	ST MARYS COUNTY MARYLAND
MD-043	WASHINGTON COUNTY MARYLAND
ME-007	FRANKLIN COUNTY MAINE
MI-003	ALGER COUNTY MICHIGAN
MI-005	ALLEGAN COUNTY MICHIGAN
MI-011	ARENAC COUNTY MICHIGAN
MI-033	CHIPPEWA COUNTY MICHIGAN
MI-053	GOGEBIC COUNTY MICHIGAN
MI-061	HOUGHTON COUNTY MICHIGAN
MI-063	HURON COUNTY MICHIGAN
MI-075	JACKSON COUNTY MICHIGAN
MI-081	KENT COUNTY MICHIGAN
MI-109	MENOMINEE COUNTY MICHIGAN
MI-125	OAKLAND COUNTY MICHIGAN
MI-161	WASHTENAW COUNTY MICHIGAN
MI-163	WAYNE COUNTY MICHIGAN
MN-019	CARVER COUNTY MINNESOTA
MN-035	CROW WING COUNTY MINNESOTA
MN-037	DAKOTA COUNTY MINNESOTA
MN-041	DOUGLAS COUNTY MINNESOTA
MN-049	GOODHUE COUNTY MINNESOTA
MN-053	HENNEPIN COUNTY MINNESOTA
MN-055	HOUSTON COUNTY MINNESOTA
MN-061	ITASCA COUNTY MINNESOTA
MN-075	LAKE COUNTY MINNESOTA
MN-085	MCLEOD COUNTY MINNESOTA
MN-103	NICOLLET COUNTY MINNESOTA
MN-109	OLMSTED COUNTY MINNESOTA
MN-123	RAMSEY COUNTY MINNESOTA
MN-131	RICE COUNTY MINNESOTA
MN-137	ST LOUIS COUNTY MINNESOTA
MN-141	SHERBURNE COUNTY MINNESOTA
MN-153	TODD COUNTY MINNESOTA

SYMBOL	FULL NAME
MN-161	WASECA COUNTY MINNESOTA
MN-163	WASHINGTON COUNTY MINNESOTA
MN-165	WATONWAN COUNTY MINNESOTA
MS-059	JACKSON COUNTY MISSISSIPPI
MS-135	TALLAHATCHIE COUNTY MISSISSIPPI
MS-145	UNION COUNTY MISSISSIPPI
NC-013	BEAUFORT COUNTY NORTH CAROLINA
NC-045	CLEVELAND COUNTY NORTH CAROLINA
NC-095	HYDE COUNTY NORTH CAROLINA
NC-129	NEW HANOVER COUNTY NORTH CAROLINA
NC-169	STOKES COUNTY NORTH CAROLINA
NC-183	WAKE COUNTY NORTH CAROLINA
NC-187	WASHINGTON COUNTY NORTH CAROLINA
ND-057	MERCER COUNTY NORTH DAKOTA
NE-109	LANCASTER COUNTY NEBRASKA
NE-141	PLATTE COUNTY NEBRASKA
NE-167	STANTON COUNTY NEBRASKA
NJ-017	HUDSON COUNTY NEW JERSEY
NJ-035	SOMERSET COUNTY NEW JERSEY
NM-049	SANTA FE COUNTY NEW MEXICO
NV-003	CLARK COUNTY NEVADA
NV-027	PERSHING COUNTY NEVADA
NV-031	WASHOE COUNTY NEVEDA
NY-005	BOROUGH OF BRONX NEW YORK
NY-023	CORTLAND COUNTY NEW YORK
NY-025	DELAWARE COUNTY NEW YORK
NY-029	ERIE COUNTY NEW YORK
NY-035	FULTON COUNTY NEW YORK
NY-055	MONROE COUNTY NEW YORK
NY-057	MONTGOMERY COUNTY NEW YORK
NY-059	NASSAU COUNTY NEW YORK
NY-065	ONEIDA COUNTY NEW YORK
NY-069	ONTARIO COUNTY NEW YORK
NY-085	BOROUGH OF RICHMOND NEW YORK
NY-091	SARATOGA COUNTY NEW YORK
NY-103	SUFFOLK COUNTY NEW YORK
NY-111	ULSTER COUNTY NEW YORK
NY-119	WESTCHESTER COUNTY NEW YORK
OH-011	AUGLAIZE COUNTY OHIO
OH-013	BELMONT COUNTY OHIO
OH-017	BUTLER COUNTY OHIO
OH-023	CLARK COUNTY OHIO
OH-031	COSHOCTON COUNTY OHIO
OH-035	CUYAHOGA COUNTY OHIO
OH-045	FAIRFIELD COUNTY OHIO
OH-041	DELAWARE COUNTY OHIO
OH-045	FAIRFIELD COUNTY OHIO
OH-047	FAYETTE COUNTY OHIO
OH-049	FRANKLIN COUNTY OHIO
OH-051	FULTON COUNTY OHIO
OH-055	GEAUGA COUNTY OHIO
OH-057	GREENE COUNTY OHIO
OH-063	HANCOCK COUNTY OHIO
OH-083	KNOX COUNTY OHIO
OH-089	LICKING COUNTY OHIO
OH-095	LUCAS COUNTY OHIO
OH-099	MAHONING COUNTY OHIO

SYMBOL	FULL NAME
OH-107	MERCER COUNTY OHIO
OH-109	MIAMI COUNTY OHIO
OH-113	MONTGOMERY COUNTY OHIO
OH-119	MUSKINGUM COUNTY OHIO
OH-133	PORTAGE COUNTY OHIO
OH-147	SENECA COUNTY OHIO
OH-151	STARK COUNTY OHIO
OH-153	SUMMIT COUNTY OHIO
OH-157	TUSCARAWAS COUNTY OHIO
OH-159	UNION COUNTY OHIO
OK-003	ALFALFA COUNTY OKLAHOMA
OK-133	SEMINOLE COUNTY OKLAHOMA
OR-003	BENTON COUNTY OREGON
OR-005	CLACKAMAS COUNTY OREGON
OR-011	COOS COUNTY OREGON
OR-015	CURRY COUNTY OREGON
OR-017	DESCHUTES COUNTY OREGON
OR-019	DOUGLAS COUNTY OREGON
OR-029	JACKSON COUNTY OREGON
OR-033	JOSEPHINE COUNTY OREGON
OR-035	KLAMATH COUNTY OREGON
OR-039	LANE COUNTY OREGON
OR-041	LINCOLN COUNTY OREGON
OR-043	LINN COUNTY OREGON
OR-045	MALHEUR COUNTY OREGON
OR-047	MARION COUNTY OREGON
OR-049	MORROW COUNTY OREGON
OR-051	MULTNOMAH COUNTY OREGON
OR-053	POLK COUNTY OREGON
OR-059	UMATILLA COUNTY OREGON
OR-067	WASHINGTON COUNTY OREGON
OR-071	YAMHILL COUNTY OREGON
PA-003	ALLEGHENY COUNTY PENNSYLVANIA
PA-029	CHESTER COUNTY PENNSYLVANIA
PA-085	MERCER COUNTY PENNSYLVANIA
PA-091	MONTGOMERY COUNTY PENNSYLVANIA
PA-133	YORK COUNTY PENNSYLVANIA
SC-003	AIKEN COUNTY SOUTH CAROLINA
SC-013	BEAUFORT COUNTY SOUTH CAROLINA
SC-043	GEORGETOWN COUNTY SOUTH CAROLINA
SC-063	LEXINGTON COUNTY SOUTH CAROLINA
SC-083	SPARTANBURG COUNTY SOUTH CAROLINA
TN-003	BEDFORD COUNTY TENNESSEE
TN-069	HARDEMAN COUNTY TENNESSEE
TX-039	BRAZORIA COUNTY TEXAS
TX-049	BROWN COUNTY TEXAS
TX-057	CALHOUN COUNTY TEXAS
TX-141	EL PASO COUNTY TEXAS
TX-165	GAINES COUNTY TEXAS
TX-177	GONZALES COUNTY TEXAS
TX-195	HANSFORD COUNTY TEXAS
TX-281	LAMPASAS COUNTY TEXAS
TX-321	MATAGORDA COUNTY TEXAS
TX-355	NUECES COUNTY TEXAS
UT-027	MILLARD COUNTY UTAH
UT-035	SALT LAKE COUNTY UTAH
UT-041	SEVIER COUNTY UTAH

SYMBOL	FULL NAME
UT-047	UINTAH COUNTY UTAH
UT-049	UTAH COUNTY UTAH
UT-051	WASATCH COUNTY UTAH
UT-053	WASHINGTON COUNTY UTAH
VA-009	AMHERST COUNTY VIRGINIA
VA-013	ARLINGTON COUNTY VIRGINIA
VA-019	BEDFORD COUNTY VIRGINIA
VA-031	CAMPBELL COUNTY VIRGINIA
VA-059	FAIRFAX COUNTY VIRGINIA
VA-061	FAUQUIER COUNTY VIRGINIA
VA-085	HANOVER COUNTY VIRGINIA
VA-087	HENRICO COUNTY VIRGINIA
VA-095	JAMES CITY COUNTY VIRGINIA
VA-153	PRINCE WILLIAM COUNTY VIRGINIA
VA-199	YORK COUNTY VIRGINIA
WA-001	ADAMS COUNTY WASHINGTON
WA-005	BENTON COUNTY WASHINGTON
WA-009	CLALLAM COUNTY WASHINGTON
WA-011	CLARK COUNTY WASHINGTON
WA-015	COWLITZ COUNTY WASHINGTON
WA-017	DOUGLAS COUNTY WASHINGTON
WA-021	FRANKLIN COUNTY WASHINGTON
WA-025	GRANT COUNTY WASHINGTON
WA-027	GRAYS HARBOR COUNTY WASHINGTON
WA-029	ISLAND COUNTY WASHINGTON
WA-033	KING COUNTY WASHINGTON
WA-039	KLICKITAT COUNTY WASHINGTON
WA-041	LEWIS COUNTY WASHINGTON
WA-043	LINCOLN COUNTY WASHINGTON
WA-047	OKANOGAN COUNTY WASHINGTON
WA-049	PACIFIC COUNTY WASHINGTON
WA-053	PIERCE COUNTY WASHINGTON
WA-057	SKAGIT COUNTY WASHINGTON
WA-061	SNOHOMISH COUNTY WASHINGTON
WA-063	SPOKANE COUNTY WASHINGTON
WA-065	STEVENS COUNTY WASHINGTON
WA-067	THURSTON COUNTY WASHINGTON
WA-077	YAKIMA COUNTY WASHINGTON
WI-003	ASHLAND COUNTY WISCONSIN
WI-005	BARRON COUNTY WISCONSIN
WI-007	BAYFIELD COUNTY WISCONSIN
WI-009	BROWN COUNTY WISCONSIN
WI-013	BURNETT COUNTY WISCONSIN
WI-019	CLARK COUNTY WISCONSIN
WI-025	DANE COUNTY WISCONSIN
WI-027	DODGE COUNTY WISCONSIN
WI-031	DOUGLAS COUNTY WISCONSIN
WI-033	DUNN COUNTY WISCONSIN
WI-039	FOND DU LAC COUNTY WISCONSIN
WI-078	MEN0MINEE COUNTY WISCONSIN
WI-095	POLK COUNTY WISCONSIN
WI-099	PRICE COUNTY WISCONSIN
WI-101	RACINE COUNTY WISCONSIN
WI-113	SAWYER COUNTY WISCONSIN
WI-119	TAYLOR COUNTY WISCONSIN
WI-129	WASHBURN COUNTY WISCONSIN
WV-069	OHIO COUNTY WEST VIRGINIA
WV-085	RITCHIE COUNTY WEST VIRGINIA

MUNICIPAL AGENCIES (CITIES)

SYMBOL	FULL NAME
AK0130	CITY OF ANCHORAGE ALASKA
AK1250	CITY OF KETCHIKAN ALASKA
AL0930	CITY OF DOTHAN ALABAMA
AL1730	CITY OF HUNTSVILLE ALABAMA
AL2130	CITY OF MONTGOMERY ALABAMA
AR2320	CITY OF LITTLE ROCK ARKANSAS
AR3390	CITY OF ROGERS ARKANSAS
AR3880	CITY OF TUPELO ARKANSAS
AR4063	CITY OF WELDON ARKANSAS
AZ0370	CITY OF PHOENIX ARIZONA
AZ0420	CITY OF SCOTTSDALE ARIZONA
AZ0490	CITY OF TEMPE ARIZONA
CA0010	CITY OF ALAMEDA CALIFORNIA
CA0080	CITY OF ANAHEIM CALIFORNIA
CA0340	CITY OF BERKELEY CALIFORNIA
CA0470	CITY OF BUENA PARK CALIFORNIA
CA0480	CITY OF BURBANK CALIFORNIA
CA0537	CITY OF CAMPBELL CALIFORNIA
CA0710	CITY OF CHULA VISTA CALIFORNIA
CA0790	CITY OF COLTON CALIFORNIA
CA0850	CITY OF CORONA CALIFORNIA
CA1182	CITY OF ENCINITAS CALIFORNIA
CA1220	CITY OF EUREKA CALIFORNIA
CA1364	CITY OF FREMONT CALIFORNIA
CA1370	CITY OF FRESNO CALIFORNIA
CA1430	CITY OF GLENDALE CALIFORNIA
CA1450	CITY OF GONZALES CALIFORNIA
CA1520	CITY OF GUSTINE CALIFORNIA
CA1540	CITY OF HANFORD CALIFORNIA
CA1560	CITY OF HAYWARD CALIFORNIA
CA1580	CITY OF HEMET CALIFORNIA
CA1660	CITY OF HUNTINGTON BEACH CALIFORNIA
CA1970	CITY OF LONG BEACH CALIFORNIA
CA1980	CITY OF LOS ANGELES CALIFORNIA
CA2090	CITY OF MARTINEZ CALIFORNIA
CA2280	CITY OF MORGAN HILL CALIFORNIA
CA2290	CITY OF MORROW BAY CALIFORNIA
CA2330	CITY OF NAPA CALIFORNIA
CA2390	CITY OF NEWMAN CALIFORNIA
CA2460	CITY OF NOVATO CALIFORNIA
CA2480	CITY OF OAKLAND CALIFORNIA
CA2550	CITY OF ONTARIO CALIFORNIA
CA2646	CITY OF PALM DESERT CALIFORNIA
CA2650	CITY OF PALM SPRINGS CALIFORNIA
CA2700	CITY OF PASADENA CALIFORNIA
CA2780	CITY OF PISMO BEACH CALIFORNIA
CA2840	CITY OF PLEASANTON CALIFORNIA
CA2880	CITY OF PORTERVILLE CALIFORNIA
CA2940	CITY OF RED BLUFF CALIFORNIA
CA2970	CITY OF REDONDO BEACH CALIFORNIA
CA2980	CITY OF REDWOOD CITY CALIFORNIA

SYMBOL	FULL NAME
CA3070	CITY OF RIVERSIDE CALIFORNIA
CA3210	CITY OF SAN BERNARDINO CALIFORNIA
CA3260	CITY OF SAN DIEGO CALIFORNIA
CA3280	CITY OF SAN FERNANDO CALIFORNIA
CA3290	CITY OF SAN FRANCISCO CALIFORNIA
CA3340	CITY OF SAN JOSE CALIFORNIA
CA3370	CITY OF SAN LUIS OBISPO CALIFORNIA
CA3380	CITY OF SAN MARINO CALIFORNIA
CA3390	CITY OF SAN MATEO CALIFORNIA
CA3410	CITY OF SAN RAFAEL CALIFORNIA
CA3420	CITY OF SANTA ANA CALIFORNIA
CA3440	CITY OF SANTA CLARA CALIFORNIA
CA3460	CITY OF SANTA MARIA CALIFORNIA
CA3480	CITY OF SANTA PAULA CALIFORNIA
CA3490	CITY OF SANTA ROSA CALIFORNIA
CA3590	CITY OF SELMA CALIFORNIA
CA3660	CITY OF SONOMA CALIFORNIA
CA3800	CITY OF SUSANVILLE CALIFORNIA
CA3920	CITY OF TULARE CALIFORNIA
CA4020	CITY OF VALLEJO CALIFORNIA
CA4027	CITY OF VENTURA CALIFORNIA
CA4070	CITY OF WALNUT CREEK CALIFORNIA
CA4100	CITY OF WATSONVILLE CALIFORNIA
CO0110	CITY OF AURORA COLORADO
CO0253	CITY OF BROOMFIELD COLORADO
CO0600	CITY AND COUNTY OF DENVER
CO0880	CITY OF FORT MORGAN COLORADO
CO2150	CITY OF ROCKY FORD COLORADO
CO2558	CITY OF WIGGINS COLORADO
CT0080	CITY OF BRIDGEPORT CONNECTICUT
CT0237	CITY OF FARMINGTON CONNECTICUT
CT0280	CITY OF HARTFORD CONNECTICUT
CT0360	CITY OF MADISON CONNECTICUT
CT0370	CITY OF MERIDEN CONNECTICUT
CT0380	CITY OF MIDDLETOWN CONNECTICUT
CT0430	CITY OF NEW HAVEN CONNECTICUT
CT0810	CITY OF WATERBURY CONNECTICUT
DC001	CITY OF WASHINGTON DC
FL0290	CITY OF BOCA RATON FLORIDA
FL0570	CITY OF CLEARWATER FLORIDA
FL0780	CITY OF DAYTONA BEACH FLORIDA
FL1420	CITY OF HOLLYWOOD FLORIDA
FL1510	CITY OF JACKSONVILLE FLORIDA
FL1590	CITY OF KISSIMMEE FLORIDA
FL1690	CITY OF LAKELAND FLORIDA
FL2010	CITY OF MIAMI FLORIDA
FL2270	CITY OF OCALA FLORIDA
FL2360	CITY OF ORLANDO FLORIDA
FL2730	CITY OF ST PETERSBURG FLORIDA
FL2940	CITY OF TALLAHASSEE FLORIDA
FL3070	CITY OF VERO BEACH
GA0280	CITY OF ATLANTA GEORGIA
GA0760	CITY OF BRUNSWICK GEORGIA
GA1780	CITY OF DUBLIN GEORGIA

MUNICIPAL AGENCIES (CITIES) - CONTINUED

SYMBOL	FULL NAME
GA3440	CITY OF MARIETTA GEORGIA
GA4910	CITY OF SAVANNAH GEORGIA
HI2400	CITY OF HONOLULU HAWAII
IA2520	CITY OF DYSART IOWA
IA2530	CITY OF EAGLE GROVE IOWA
IA5240	CITY OF MAQUOKETA IOWA
IA7490	CITY OF SAC CITY IOWA
IA8880	CITY OF WEBSTER CITY IOWA
ID0300	CITY OF COUER D'ALENE IDAHO
ID0790	CITY OF IDAHO FALLS IDAHO
id1200	CITY OF MANPA ISAHO
ID1830	CITY OF TWIN FALLS IDAHO
IL0512	CITY OF BARRINGTON HILLS ILLINOIS
IL0840	CITY OF BLOOMINGTON ILLINOIS
IL1550	CITY OF CHAMPAIGN ILLINOIS
IL1670	CITY OF CHICAGO ILLINOIS
IL2380	CITY OF DIXON ILLINOIS
IL3200	CITY OF FREEBURG ILLINOIS
IL3910	CITY OF HIGHLAND PARK ILLINOIS
IL4710	CITY OF LAWRENCEVILLE ILLINOIS
IL4910	CITY OF LOCKPORT ILLINOIS
IL5360	CITY OF MASON CITY ILLINOIS
IL6850	CITY OF PEORIA ILLINOIS
IL7460	CITY OF ROCKFORD ILLINOIS
IL7640	CITY OF ST CHARLES ILLINOIS
IL9210	CITY OF WESTERN SPRINGS ILLINOIS
IL9450	CITY OF WINNEBAGO ILLINOIS
IN1830	CITY OF GOSHEN INDIANA
IN3480	CITY OF NEW HAVEN INDIANA
KS1950	CITY OF GARDEN CITY KANSAS
KS5400	CITY OF TOPEKA KANSAS
KY2090	CITY OF LOUISVILLE KENTUCKY
LA0040	CITY OF ALEXANDRIA LOUISIANA
LA0230	CITY OF BOSSIER CITY
LA1150	CITY OF JONESBORO LOUISIANA
LA1690	CITY OF NEW ORLEANS LOUISIANA
LA2410	CITY OF WEST MONROE LOUISIANA
MA0035	CITY OF ANDOVER MASSACHUSETTS
MA0120	CITY OF BOSTON MASSACHUSETTS
MA0170	CITY OF CAMBRIDGE MASSACHUSETTS
MA0660	CITY OF MALDEN MASSACHUSETTS
MA1520	CITY OF WORCESTER MASSACHUSETTS
MD0050	CITY OF BALTIMORE MARYLAND
MD0480	CITY OF EASTON MARYLAND
MD0580	CITY OF FREDERICK MARYLAND
MD0730	CITY OF HAGERSTOWN MARYLAND
MD1380	CITY OF SALISBURY MARYLAND
ME0250	CITY OF BANGOR MAINE
ME6400	CITY OF PORTLAND MAINE
MI0150	CITY OF ANN ARBOR MAINE
MI0310	CITY OF BATTLE CREEK MICHIGAN
MI0490	CITY OF BIRMINGHAM MICHIGAN
MI0700	CITY OF CADILLAC MICHIGAN

SYMBOL	FULL NAME
MI0890	CITY OF CHARLOTTE MICHIGAN
MI1150	CITY OF CROSWELL MICHIGAN
MI1260	CITY OF DETROIT MICHIGAN
MI1730	CITY OF FLINT MICHIGAN
MI1800	CITY OF FRANKFORT MICHIGAN
MI2010	CITY OF GRAND RAPIDS MICHIGAN
MI2520	CITY OF KALAMAZOO MICHIGAN
MI2990	CITY OF MANTON MICHIGAN
MI3320	CITY OF MONROE MICHIGAN
MI3740	CITY OF OTSEGO MICHIGAN
MI4020	CITY OF PONTIAC MICHIGAN
MI4060	CITY OF PORT HURON
MI4760	CITY OF STURGIS MICHIGAN
MI4905	CITY OF TROY MICHIGAN
MI5310	CITY OF WYANDOTTE MICHIGAN
MN1150	CITY OF CHAMPLIN MINNESOTA
MN1210	CITY OF CHISHOLM MINNESOTA
MN2860	CITY OF GRANITE FALLS MINNESOTA
MN3460	CITY OF HUTCHINSON MINNESOTA
MN4760	CITY OF MINNEAPOLIS MINNESOTA
MN5660	CITY OF PINE CITY MINNESOTA
MO4100	CITY OF JOPLIN MISSOURI
MO7070	CITY OF ST JOSEPH MISSOURI
MO7080	CITY OF ST LOUIS MISSOURI
NC0870	CITY OF CHARLOTTE NORTH CAROLINA
NC1040	CITY OF CONCORD NORTH CAROLINA
NC1460	CITY OF ELIZABETH CITY NORTH CAROLINA
NC1940	CITY OF GREENSBORO NORTH CAROLINA
NC2450	CITY OF KINSTON NORTH CAROLINA
NC3100	CITY OF MONROE NORTH CAROLINA
NC4070	CITY OF SALISBURY NORTH CAROLINA
NH0020	CITY OF BERLIN NEW HAMPSHIRE
NH0070	CITY OF CONCORD NEW HAMPSHIRE
NH0310	CITY OF MANCHESTER NEW HAMPSHIRE
NH0430	CITY OF PORTSMOUTH NEW HAMPSHIRE
NJ0520	CITY OF CAMDEN NEW JERSEY
NJ1775	CITY OF LYNDHURST NEW JERSEY
NJ2130	CITY OF NEWARK NEW JERSEY
NJ2498	CITY OF PARSIPPANY NEW JERSEY
NJ2510	CITY OF PATERSON NEW JERSEY
NJ2570	CITY OF PERTH AMBOY NEW JERSEY
NJ2710	CITY OF PRINCETON NEW JERSEY
NJ3380	CITY OF TRENTON NEW JERSEY
NJ3705	CITY OF WOODBRIDGE NEW JERSEY
NM0030	CITY OF ALBUQUERQUE NEW MEXICO
NM0170	CITY OF CLAYTON NEW MEXICO
NM0470	CITY OF LAS CRUCES NEW MEXICO
NM0710	CITY OF SANTA FE NEW MEXICO
NV0139	CITY OF MOUNTAIN CITY NEVADA
NV0150	CITY OF NORTH LAS VEGAS
NV0170	CITY OF RENO NEVADA
NY0750	CITY OF BUFFALO NEW YORK
NY3070	CITY OF LACKAWANNA NEW YORK

MUNICIPAL AGENCIES (CITIES) - CONTINUED

SYMBOL	FULL NAME
NY3340	CITY OF LOCKPORT NEW YORK
NY3940	CITY OF MOUNT VERNON NEW YORK
NY4120	CITY OF NEW ROCHELLE NEW YORK
NY4170	CITY OF NEW YORK NEW YORK
NY4210	CITY OF NIAGARA FALLS NEW YORK
NY5230	CITY OF ROCHESTER NEW YORK
NY5550	CITY OF SCHENECTADY NEW YORK
NY6450	CITY OF WATERTOWN NEW YORK
NY6820	CITY OF YONKERS NEW YORK
OH0070	CITY OF AKRON OHIO
OH1320	CITY OF CANTON OHIO
OH1610	CITY OF CINCINNATI OHIO
OH1680	CITY OF CLEVELAND OHIO
OH1800	CITY OF COLUMBUS OHIO
OH2090	CITY OF DAYTON OHIO
OH3880	CITY OF KENT OHIO
OH3895	CITY OF KETTERING OHIO
OH4730	CITY OF MARIETTA OHIO
OH4820	CITY OF MASSILLON OHIO
OH7200	CITY OF ST CLAIRSVILLE OHIO
OH8070	CITY OF TIFFIN OHIO
OH8120	CITY OF TOLEDO OHIO
OR0420	CITY OF CORVALLIS OREGON
OR1225	CITY OF LINCOLN CITY OREGON
OR1260	CITY OF MCMINNVILLE OREGON
OR1310	CITY OF MEDFORD OREGON
OR1500	CITY OF NEWPORT OREGON
OR1510	CITY OF NORTH BEND OREGON
OR1650	CITY OF PORTLAND OREGON
OR1810	CITY OF SALEM OREGON
PA0110	CITY OF ALLENTOWN PENNSYLVANIA
PA1230	CITY OF CHAMBERSBURG PENNSYLVANIA
PA1296	CITY OF CHESTER TOWNSHIP PENNSYLVANIA
PA1335	CITY OF CLAIRTON PENNSYLVANIA
PA2270	CITY OF EASTON PENNSYLVANIA
PA4010	CITY OF JOHNSTOWN PENNSYLVANIA
PA6540	CITY OF PHILADELPHIA PENNSYLVANIA
PA6600	CITY OF PITTSBURGH PENNSYLVANIA
PA8880	CITY OF WASHINGTON PENNSYLVANIA
PA8920	CITY OF WAYNESBORO PENNSYLVANIA
SC0020	CITY OF AIKEN SOUTH CAROLINA
SC0370	CITY OF CAYCE SOUTH CAROLINA
SC1040	CITY OF GREENVILLE SOUTH CAROLINA
SD2450	CITY OF SIOUX FALLS SOUTH DAKOTA
SD2730	CITY OF VERMILLION SOUTH DAKOTA
SD3070	CITY OF YANKTON SOUTH DAKOTA
TX0260	CITY OF ARLINGTON TEXAS
TX0530	CITY OF BELLAIRE TEXAS
TX1550	CITY OF CORPUS CHRISTI TEXAS
TX1730	CITY OF DALLAS TEXAS
TX2190	CITY OF EL PASO TEXAS

MUNICIPAL AGENCIES (CITIES) - CONTINUED

SYMBOL	FULL NAME
TX2450	CITY OF FORT WORTH TEXAS
TX3280	CITY OF HOUSTON TEXAS
TX4530	CITY OF MESQUITE TEXAS
TX5430	CITY OF PORT ARTHUR TEXAS
TX6090	CITY OF SAN ANTONIO TEXAS
UT1560	CITY OF PROVO UTAH
VA0130	CITY OF BEDFORD VIRGINIA
VA0690	CITY OF CULPEPER VIRGINIA
VA0720	CITY OF DANVILLE VIRGINIA
VA0930	CITY OF FALLS CHURCH VIRGINIA
VA1180	CITY OF HAMPTON VIRGINIA
VA1490	CITY OF LYNCHBURG VIRGINIA
VA1720	CITY OF NEWPORT NEWS VIRGINIA
VA1760	CITY OF NORFOLK VIRGINIA
VA2060	CITY OF RICHMOND VIRGINIA
VA2330	CITY OF STAUNTON VIRGINIA
VA2540	CITY OF VIRGINIA BEACH VIRGINIA
VA2570	CITY OF WARRENTON VIRGINIA
VT0120	CITY OF BURLINGTON VERMONT
VT0155	CITY OF COLCHESTER VERMONT
VT0576	CITY OF ROCKINGHAM VERMONT
VT0686	CITY OF WEATHERSFIELD TOWN VERMONT
WA0109	CITY OF BELLEVUE WASHINGTON
WA0180	CITY OF BREMERTON WASHINGTON
WA1190	CITY OF LONGVIEW WASHINGTON
WA1550	CITY OF OAK HARBOR WASHINGTON
WA1820	CITY OF REDMOND WASHINGTON
WA1850	CITY OF RICHLAND WASHINGTON
WA1960	CITY OF SEATTLE WASHINGTON
WA2110	CITY OF SPOKANE WASHINGTON
WA2230	CITY OF TAKOMA WASHINGTON
WI1470	CITY OF EAU CLAIRE WISCONSIN
WI1760	CITY OF FORT ATKINSON WISCONSIN
WI2320	CITY OF JANESVILLE WISCONSIN
WI3100	CITY OF MILWAUKEE WISCONSIN
WI3810	CITY OF PLYMOUTH WISCONSIN
WI3970	CITY OF RACINE WICONSIN
WI4060	CITY OF RHINELANDER WISCONSIN
WI4330	CITY OF SHEBOYGAN WISCONSIN
WI4730	CITY OF SUPERIOR WISCONSIN
WV0260	CITY OF BLUEFIELD WEST VIRGINIA

SYMBOL	FULL NAME
ACSWM	ADDISON COUNTY SOLID WASTE MANAGEMENT DEPARTMENT
ACWD	ALAMEDA COUNTY WATER DISTRICT
AEWD	ARVIN-EDISON WATER DISTRICT
ATHCE	ATHENS COUNTY ENGINEER
BART	BAY AREA RAPID TRANSIT
BCE	BROWARD COUNTY ENGINEERS
BCED	BOSSIER CITY ENGINEERING DEPARTMENT
BCLID	BURNETTE COUNTY LAND INFORMATION DEPARTMENT
BRICKT	BRICK TOWNSHIP NEW JERSEY
BUTCOE	BUTLER COUNTY ENGINEERS
CCPUD	CHELAN COUNTY PUBLIC UTILITIES DISTRICT
CHERRY	CHERRY HILL TOWNSHIP NEW JERSEY
CID	CENTERVILLE IRRIGATION DISTRICT
CMMUA	CAPE MAY MUA
CODDOP	CITY OF DAYTON DEPARTMENT OF PLANNING
COOSCS	COOS COUNTY SURVEYOR
COUNTY	COUNTY LINE
CRGS	CLEVELAND REGIONAL GEODETIC SURVEY
CSDOU	COLORADO SPRINGS DEPARTMENT OF UTILITIES
CURRCS	CURRY COUNTY SURVEYOR
DCE	DELAWARE COUNTY ENGINEER
DCENG	DOUGLAS COUNTY ENGINEER
DCGIS	DOUGLAS COUNTY GIS
DCPW	DOUGLAS COUNTY PUBLIC WORKS
DCPWD	DADE COUNTY PUBLIC WORKS DEPARTMENT
DEFCE	DEFIANCE COUNTY ENGINEER
DMWW	DENVER MUNICIPAL WATER WORKS
DOUGCS	DOUGLAS COUNTY SURVEYOR
EBDA	EAST BAY SEWAGE DISCHARGE AUTHORITY
EBMUD	EAST BAY MUNICIPAL UTILITIES DISTRICT
FCA	FAIRFIELD COUNTY AUDITOR
FCE	FRANKLIN COUNTY ENGINEERS
FULCOE	FULTON COUNTY ENGINEERS
GCENG	GREENE COUNTY ENGINEER
GCPUD	GRANT COUNTY PUBLIC UTILITIES DISTRICT
HAMTWP	HAMILTON TOWNSHIP NEW JERSEY
HCFC	HARRIS COUNTY TEXAS FLOOD CONTROL DISTRICT
HCS	HAMILTON COUNTY SURVEYOR
HGCSD	HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
HHWS	HETCH HETCHY WATER SUPPLY DISTRICT
IAA	INDIANAPOLIS AIRPORT AUTHORITY
IID	IMPERIAL IRRIGATION DISTRICT
IMAGIS	INDIANAPOLIS MAPPING AND GEOGRAPHIC INFRA SYSTEM
JCAD	JEFFERSON COUNTY APPRAISAL DISTRICT
JCMD	JEFFERSON COUNTY MAPPING DEPARTMENT
LACFCD	LOS ANGELES FLOOD CONTROL DISTRICT
LAHRBR	LOS ANGELES HARBOR DEPARTMENT
LAWPC	LOS ANGELES WATER AND POWER COMMISSION
LFUCG	LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT
LVDPW	LAS VEGAS DEPARTMENT OF PUBLIC WORKS
MARTA	METROPOLITAN ATLANTA RAPID TRANSIT AUTHORITY
MCDOT	MARICOPA COUNTY DEPARTMENT OF TRANSPORATION
MCED	MARION COUNTY ENGINEERING DEPARTMENT
MCSO	MARION COUNTY SURVEYOR OFFICE
METAA	METROPOLITAN AIRPORT AUTHORITY MID
MODESTO	IRRIGATION DISTRICT

SYMBOL	FULL NAME
MRGCD	MIDDLE RIO GRANDE CONSERVATION DISTRICT
MRMSC	MILWAUKEE-RACINE METROPOLITAN SEWAGE COMM
MSLACO	MISSOULA COUNTY SURVEYOR
MWAA	METROPOLITAN WASHINGTON AIRPORT AUTHORITY
NJ05ED	BURLINTON COUNTY ENGINEERING DEPARTMENT
NNWW	NEWPORT NEWS WATER WORKS
NOS+WB	NEW ORLEANS SEWERAGE AND WATER BOARD
NYNJPA	NEW YORK/NEW JERSEY PORT AUTHORITY
NYPA	NEW YORK PORT AUTHORITY
OCS	ORANGE COUNTY SURVEYORS
OID	OAKDALE IRRIGATION DISTRICT
OKECPA	OKEECHOBEE COUNTY PROPERTY APPRAISERS
OROW	OHIO RIVER ORDINANCE WORKS
PCED	PINELLAS COUNTY ENGINEERS DEPARTMENT
PCLIO	POLK COUNTY LAND INFORMATION OFFICE WISCONSIN
PIMACO	PIMA CO DEPT OF TRANSP AND FLOOD CONTROL DIST
PMDPW	PLYMOUTH MA DEPARTMENT OF PUBLIC WORKS
PTHT	PARSIPPANY TROY HILLS TOWNSHIP
RCFC	RIVERSIDE COUNTY FLOOD CONTROL
RCOS	RIVERSIDE COUNTY SURVEYOR
RIRD	RYER ISLAND RECLAMATION DISTRICT
RTSD	REGIONAL TRANSIT DISTRICT
SCCS	SANTA CLARA COUNTY SURVEYOR
SCSUR	SEMINOLE COUNTY SURVEYOR
SDWD	SAN DIEGO WATER DISTRICT
SEWRPC	SE WISCONSIN REGIONAL PLANNING COMMISSION
SFLWMD	SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWD	SAN FRANCISCO WATER DEPARTMENT
SJCS	ST JOSEPH COUNTY SURVEYOR
SJID	SAN JOAQUIN IRRIGATION DISTRICT
SJRWMD	ST JOHNS RIVER WATER MANAGEMENT DISTRICT
SLCPS	SALT LAKE CITY PUBLIC SERVICES
SLCS	SALT LAKE COUNTY SURVEYOR
SOUTH	SOUTHERN NEVADA WATER AUTHORITY
SRPE	SAVANNAH RIVER PLANT ENGINEER
SRVWUA	SALT RIVER VALLEY WATER USERS ASSOCIATION
SVIP	SACRAMENTO VALLEY IRRIGATION PROJECT
SWFWMD	SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
TID	TURLOCK IRRIGATION DISTRICT
TLAKE	TULARE LAKE IRRIGATION DISTRICT
TLC	TALLAHASSEE-LEON COUNTY
TPCG	TERREBONNE PARISH CONSOLIDATED GOVERNMENT LIS
TWWP	THE WASHINGTON WATER POWER COMPANY
UPPERA	UPPER ALLEN TOWNSHIP PENNSYLVANIA
WACRM	WASHINGTON COUNTY REFERENCE MARK
WMATA	WASHINGTON METROPOLITAN AREA TRANSIT AUTH
WSSC	WASHINGTON SUBURBAN SANITARY COMMISSION

RAILROADS

SYMBOL	FULL NAME
ACYRR	AKRON CANTON AND YOUNGSTOWN RAILROAD
AGSRR	ALABAMA GREAT SOUTHERN RAILROAD
ATNRR	ALABAMA TENNESSEE AND NORTHERN RAILROAD
ATSFRR	ATCHISON TOPEKA AND SANTA FE RAILROAD
B+ARR	BOSTON AND ALBANY RAILROAD
BARR	BANGOR AND AROOSTOOK RAILROAD
BLERR	BESSEMER AND LAKE ERIE RAILROAD
BMRR	BOSTON AND MAINE RAILROAD
BNRR	BURLINGTON NORTHERN RAILROAD
BORR	BALTIMORE AND OHIO RAILROAD
BRPRR	BUFFALO ROCHESTER PITTSBURG RAILROAD
CBQRR	CHICAGO BURLINGTON AND QUINCY RAILROAD
CHWRR	CHESAPEAKE AND WESTERN RAILROAD
CIMRR	CHICAGO AND ILLINOIS MIDLAND RAILROAD
CLGRR	COLUMBUS AND GREENVILLE RAILROAD
CMPPRR	CHICAGO MILWAUKEE ST PAUL AND PACIFIC RR
CNJRR	CENTRAL OF NEW JERSEY RAILROAD
CNWRR	CHICAGO AND NORTH WESTERN RAILROAD
CORR	CHESAPEAKE AND OHIO RAILROAD
CPRR	CANADIAN PACIFIC RAILROAD
CRNRR	CAROLINA AND NORTHWESTERN RAILROAD
CVRR	CENTRAL VERMONT RAILROAD
DHRR	DELAWARE AND HUDSON RAILROAD
DLWRR	DELAWARE LACKAWANNA AND WESTERN RAILROAD
DMIRRR	DULUTH MISSABE AND IRON RANGE RAILROAD
DMRR	DETROIT AND MACKINAW RAILROAD
DRGWRR	DENVER AND RIO GRANDE WESTERN RAILROAD
DTSRR	DETROIT AND TOLEDO SHORE LINE RAILROAD
DWPRR	DULUTH-WINNIPEG AND PACIFIC RAILROAD
ELRR	ERIE LACKAWANNA RAILROAD
ERIERR	ERIE RAILROAD
FECRR	FLORIDA EAST COAST RAILROAD
FWDRR	FORT WORTH AND DENVER CITY RAILWAY
GCSFRC	GULF COLORADO AND SANTE FE RAILWAY COMPANY
GMORR	GULF MOBILE AND OHIO RAILROAD
GNRR	GREAT NORTHERN RAILROAD
GSFRR	GEORGIA SOUTHERN AND FLORIDA RAILWAY
GTWRR	GRAND TRUNK WESTERN RAILROAD
GWRR	GREAT WESTERN RAILROAD
HRR	HUDSON RAILROAD
ICRR	ILLINOIS CENTRAL RAILROAD
INTRR	INTERSTATE RAILROAD
KCSRR	KANSAS CITY SOUTHERN RAILROAD
LARR	LOUISIANA AND ARKANSAS RAILROAD
LIRR	LONG ISLAND RAILROAD
LNRR	LOUISVILLE AND NASHVILLE RAILROAD
LVRR	LEHIGH VALLEY RAILROAD
MCRR	MICHIGAN CENTRAL RAILROAD
MKTRR	MISSOURI KANSAS TEXAS RAILROAD
MPRR	MISSOURI PACIFIC RAILROAD
NCRR	NASHVILLE CHATTANOOGA AND ST LOUIS RAILROAD
NPRR	NORTHERN PACIFIC RAILROAD
NSRR	NORFOLK SOUTHERN RAILROAD

RAILROADS - CONTINUED

SYMBOL	FULL NAME
NWPRR	NORTHWESTERN PACIFIC RAILROAD
NWRR	NORFOLK AND WESTERN RAILROAD
NYCRR	NEW YORK CENTRAL RAILROAD
NYNH+H	NEW YORK NEW HAVEN AND HARTFORD RAILROAD
NYSLRR	NEW YORK CHICAGO AND ST LOUIS RAILROAD
NYSWRR	NEW YORK SUSQUEHANNA AND WESTERN RAILROAD
PCRR	PENN CENTRAL RAILROAD
PLERR	PITTSBURGH AND LAKE ERIE RAILROAD
PMRR	PERE MARQUETTE RAILROAD
PRR	PENNSYLVANIA RAILROAD
PSFRR	PANHANDLE AND SANTA FE RAILWAY COMPANY
RDGRR	READING RAILROAD
RIRR	CHICAGO ROCK ISLAND AND PACIFIC RAILROAD
RRR	RUTLAND RAILROAD
SCLRR	SEABOARD COAST LINE RAILROAD
SDARR	SAN DIEGO AND ARIZONA EASTERN RAILWAY COMPANY
SLSFRR	ST LOUIS SAN FRANCISCO RAILROAD
SLSWRR	ST LOUIS SOUTHWESTERN RAILROAD
SNRR	SACRAMENTO NORTHERN RAILROAD
SOORR	SOO LINE RAILROAD
SOURR	SOUTHERN RAILROAD
SPRR	SOUTHERN PACIFIC RAILROAD
TMRR	TEXAS MEXICAN RAILROAD
TNRR	TEXAS AND NORTHERN RAILROAD
TPRR	TEXAS AND PACIFIC RAILWAY
TPWRR	TOLEDO PEORIA AND WESTERN RAILROAD
UPRR	UNION PACIFIC RAILROAD
VARR	VIRGINIA RAILWAY
VTRR	VERMONT RAILROAD
WARR	WESTERN OF ALABAMA RAILROAD
WLERR	WHEELING AND LAKE ERIE RAILROAD
WMRR	WESTERN MARYLAND RAILROAD
WPRR	WESTERN PACIFIC RAILROAD
Y+MVRR	YAZOO AND MISSISSIPPI VALLEY RAILROAD
YVRR	YOSEMITE VALLEY RAILROAD

UTILITY AND NATURAL RESOURCE COMPANIES

SYMBOL	FULL NAME
AEP	AMERICAN ELECTRIC POWER
AGASEL	ASSOCIATED GAS AND ELECTRIC COMPANY
ALPCO	ALABAMA POWER COMPANY
AMOCO	AMOCO OIL COMPANY
AOCO	ASSOCIATED OIL COMPANY
APC	APPALACHIAN POWER COMPANY
ARFUEL	AR FUEL OIL COMPANY
ARLAGC	AR-LA GAS COMPANY
ASC	ALYSEKA SERVICE COMPANY
ATRECO	ATLANTIC REFINING COMPANY
BOCO	BELRIDGE OIL COMPANY

SYMBOL	FULL NAME
CHOCO	CHEVRON OIL COMPANY
CITGO	CITIES SERVICE COMPANY
CONED	CONSOLIDATED EDISON POWER COMPANY
CONOCO	CONTINENTAL OIL COMPANY
CONSP	CONSUMER POWER COMPANY OF MICHIGAN
CREOL	CREOLE PETROLEUM COMPANY
CSPC	COLUMBUS SOUTHERN POWER COMPANY
CTP+L	CONNECTICUT POWER AND LIGHT COMPANY
CVPS	CENTRAL VERMONT PUBLIC SERVICE CORPORATION
DECO	DETROIT EDISON COMPANY
DUKE	DUKE POWER COMPANY
DWD	DENVER WATER DEPARTMENT
FLPCO	FLORIDA POWER COMPANY
EASTUT	EASTON UTILITIES
GAPC	GEORGIA POWER COMPANY
GPCC	GENERAL PETROLEUM CORPORATION OF CALIFORNIA
GULF	GULF REFINING COMPANY
HLPCO	HOUSTON LIGHTING AND POWER COMPANY
HOCO	HONOLULU OIL COMPANY
HUMBLE	HUMBLE OIL AND REFINING COMPANY
IMECO	INDIANA-MICHIGAN ELECTRIC COMPANY
LONESR	LONE STAR GAS COMPANY
LPCO	LAKEHEAD PIPELINE COMPANY
MINPCO	MICHIGAN NORTHERN POWER COMPANY
MOBIL	MOBIL OIL CORPORATION
MSP+L	MISSISSIPPI POWER AND LIGHT COMPANY
MWDSC	METROPOLITAN WATER DISTRICT OF SO CALIFORNIA
MWPLC	MICHIGAN-WISCONSIN PIPELINE COMPANY
NGPCA	NATURAL GAS PIPELINE COMPANY OF AMERICA
NJP+L	NEW JERSEY POWER AND LIGHT COMPANY
OHOCO	OHIO OIL COMPANY
OHPCO	OHIO POWER COMPANY
PEPCO	POTOMAC EDISON POWER COMPANY
PG+E	PACIFIC GAS AND ELECTRIC COMPANY
PHELCO	PHILADELPHIA ELECTRIC COMPANY
PHILIP	PHILLIPS PETROLEUM COMPANY
PP+L	PACIFIC POWER AND LIGHT COMPANY
PSCOCO	PUBLIC SERVICE COMPANY OF COLORADO
PSEG	PUBLIC SERVICE ELECTRIC AND GAS CO OF NEW JERSEY
PWPCO	PENNSYLVANIA WATER AND POWER COMPANY
ROCO	RICHFIELD OIL COMPANY
RPCO	REPUBLIC PRODUCTION COMPANY
SRP	SALT RIVER PROJECT
SCE+G	SOUTH CAROLINA ELECTRIC AND GAS COMPANY
SCECO	SOUTHERN CALIFORNIA EDISON COMPANY
SCPA	SOUTH CAROLINA POWER AUTHORITY
SDG+E	SAN DIEGO GAS AND ELECTRIC COMPANY
SHELL	SHELL OIL COMPANY
SOCO	STANDARD OIL COMPANY
SOGCO	SIGNAL OIL AND GAS COMPANY
SOHIO	SOHIO PETROLEUM COMPANY
SPPC	SIERRA PACIFIC POWER COMPANY
STOGC	STANOLIND OIL AND GAS COMPANY
SUBWC	SUBURBAN WATER COMPANY CALIFORNIA
SUNOCO	SUN OIL COMPANY

UTILITY AND NATURAL RESOURCE COMPANIES - CONTINUED

SYMBOL	FULL NAME
SUPOCO	SUPERIOR OIL COMPANY
TENNEC	TENNESSEE GAS AND PIPELINE COMPANY
TEXACO	TEXACO INCORPORATED
TWOCO	TIDEWATER OIL COMPANY
UNOLA	UNION TEXAS PETROLEUM
UOCO	UNION OIL COMPANY
VEPCO	VIRGINIA ELECTRIC POWER COMPANY
VOCO	VALVOLINE OIL COMPANY

SURVEYING, ENGINEERING, AND CONSTRUCTION INDUSTRY

SYMBOL	FULL NAME
AAS	ATLANTIC AERIAL SURVEYS (NOW ATLTEC)
AASCO	ATLANTIS AERIAL SURVEY COMPANY
ABRAMS	ABRAMS AERIAL SURVEYS
ABW	ABW MAPPING AND CONSULTING
ACFPS	ACF PRECISION SURVEYS INCORPORATED
ADRGS	ADR GEODETIC SERVICES
AEROS	AERO SERVICE CORPORATION
AHI	ATWELL HICKS INC
AIRLAN	AIR LAND SURVEYS INCORPORATED
AIRSUR	AIR SURVEY CORPORATION
AISS	A I SILANDER AND SON
ALBDOU	ALBANY-DOUGHERTY
ALLENG	ALLEN ENGINEERING INCORPORATED
ALSTER	ALSTER AND ASSOCIATES ENGINEERS
AME	AERO-METRIC INCORPORATED
AMGEOD	AMERICAN GEODETIC SURVEY
AMTHOM	A MORTON THOMAS AND ASSOCIATES
ANDREG	ANDREGG INCORPORATED
ARCO	ATLANTIC RICHFIELD COMPANY
ASCPC	AMERICAN SURVEYING CONSULTANTS PC
ASHLEY	ASHLEY SURVEYING INCORPORATED
ASHTEC	ASHTECH INCORPORATED
ASI	ANALYTICAL SURVEYS INCORPORATED
ATEAM	A TEAM PROFESSIONAL ASSOCIATES INCORPORATED
ATLAE	ATLANTA AIRPORT ENGINEERS
ATLTEC	ATLANTIC TECHNOLOGIES
AYLENO	AYRES LEWIS NORRIS INCORPORATED
AYRES	AYRES ASSOCIATES
B+OINC	BARBER AND OYLER, INCORPORATED
BAH	BERRIMAN & HENIGAR
BAKER	M BAKER JR INC
BANNER	BANNERMAN SURVEYORS INCORPORATED
BARTON	BARTON AERIAL TECHNOLOGIES INCORPORATED
BDE	BASKERVILLE DONOVAN INCORPORATED
BELL	BELL SURVEYING INCORPORATED
BENDIX	BENDIX CORPORATION
BESCH	BESCH CONSULTING INCORPORATED
BESTOR	BESTOR ENGINEERS INC
BFEC	BENDIX FIELD ENGINEERING CORPORATION
BFM	BFM CORPORATION
BGAS	BRUCE AND GUNN AERIAL SURVEYS
BMMS	BOUTELLE MACFARLANE MEYER AND SELEE

SYMBOL	FULL NAME
BOHAN	BOHANNAN-HUSTON INCORPORATED
BOLAND	PAUL BOLAND-ST LUCIA PRIVATE SURVEYOR
BRADY	BRADY LAND SURVEYING INC
BRIGGS	BRIGGS ENGINEERING
BRWE	BROCK AND WEYMOUTH ENGINEERS
BUN-Y	BURK + ASSOCIATES INC AND N-Y ASSOCIATES INC
BSC	BSC GROUP-SURVEYING AND MAPPING INC
BWDCO	BERKELEY WATERFRONT DEVELOPMENT COMPANY
CANDA	CERVANTES AND ASSOCIATES
CARAS	CARIBBEAN AERIAL SURVEYS INCORPORATED
CASSON	CASSON ENGINEERING COMPANY
CEJA	C E JOHNSON AND ASSOCIATES INC
CE+S	CALDWELL ENGINEERING AND SURVEYING
CFM	C F MERRIAM SURVEYOR
CHAMBA	CHAMBLIN AND ASSOCIATES
CHANCE	JE CHANCE AND ASSOCIATES
CHIAS	CHICAGO AERIAL SURVEY
CHIPPR	CHIPPERFIELD NAVIGATION SERVICES
CH2M	CH2M HILL INCORPORATED
CL	CLIFFORD LEISURE CIVIL ENGINEER
CMCO	CHARLES MAIN COMPANY
COLE	DAVID COLE PLS
COLGOV	COLBURN AND GOVE CONSULTING ENGINEERS
CONE+S	CONCORD ENGINEERING AND SURVEYING INCORPORATED
CONTE	CONTINENTAL ENGINEER
CONTRA	CONTRACT SURVEYING LIMITED
CPSSI	CPS SURVEYS INCORPORATED
CRAFT	ALLAN CRAFT SUR-CON INCORPORATED
CREDAN	CREEGAN AND D ANGELO
CRIM	CENTRO DE RECAUDACION DE INGRESOS MUNICIPALES
CSMCI	C S MARINE CONSTRUCTORS INCORPORATED
CSPC	COLUMBUS SOUTHERN POWER COMPANY
CTMAIN	CT MAIN INCORPORATED
CTMALE	C T MALE ASSOCIATES
CULTEP	CULPEPPER AND TERPENIN
DADETR	DADE-TRIM INCORPORATED
DMW	DAFT MCCUNE WALKER INCORPORATED
DAGSUR	DAGGETT SURVEYING INCORPORATED
DARA	D A RATEKIN AND ASSOCIATES
DBEC	DBEC ENGINEERING
DCJOHN	D C JOHNSON AND ASSOCIATES INCORPORATED
DEC	DAHLING ENGINEERING COMPANY
DECKER	R L DECKER
DELTA	DELTA ENGINEERS INC
DENI	DENI ASSOCIATES INCORPORATED
DEWDAV	DEWBERRY DAVIS
DMW	DAFT MCCUNE WALKER INCORPORATED
DTM	DONALD T MCQUILLAN
DUDA	DUDA LANDS INCORPORATED
DUGGER	JACK DUGGER
DUNLAP	DUNLAP ASSOCIATES
EDA	EARL DUDLEY ASSOCIATES INCORPORATED
EESCC	E E STULLER CONSTRUCTION COMPANY
EGENG	EVANS-GRAVES ENGINEERS INC

SYMBOL	FULL NAME
EGPSSC	EAGLE GPS SURVEYING CORPORATION
ENFING	ENFINGER AND ASSOCIATES P.A.
ENGDA	ENGINEERING DEVELOPMENT ASSOCIATES
EQUINO	EQUINOX INCORPORATED SURVEYING AND MAPPING
ERLAND	ERLANDSEN AND ASSOCIATES
ESP	ENGINEERING SURVEYING AND PLANNING INC
EVANS	DAVID EVANS AND ASSOCIATES INCORPORATED
EWB	E W BRAASCH CONSULTING ENGINEER
F+HINC	FLORENCE + HUTCHESON INCORPORATED
FAMC	FALCON AIR MAPS COMPANY
FAS	FAIRCHILD AERIAL SURVEYS
FE	FRASER ENGINEERING
FORBAC	FORD BACON AND DAVIS INCORPORATED
FORSGN	FORSGREN AND ASSOCIATES
GAI	GERKINWOOD AND ASSOCIATES INCORPORATED
GALENA	GALENA ENGINEERING
GBLI	GORDON B LEWIS INC
GCIOMI	GILBERT COMMONWEALTH INCORPORATE OF MICHIGAN
GCS	GEODETIC CONSULTING SERVICES
GCYI	G C Y INCORPORATED
GENES	GENESIS SURVEYING INCORPORATED (NOW GENGRP)
GENGRP	GENESIS GROUP INCORPORATED SE
GEOBAS	GEOBASE CONTROL INCORPORATED
GEOHYD	GEO-HYDRO INCORPORATED
GEOMET	GEOMETRICS GPS INCORPORATED
GEONEX	GEONEX ITECH INCORPORATED
GEOONE	GEOONE INCORPORATED
GEORES	GEO RESEARCH INCORPORATED
GEOSER	GEODETIC SERVICES INCORPORATED
GEOTRA	GEOTRACER
GGSUR	G AND G SURVEYING AND CONSULTING
GHA	G HENKENHOFF AND ASSOCIATES
GLCOOP	GARY L COOPER
GLORI	GLO RETRACEMENT INCORPORATED
GREENW	RONALD GREENWELL AND ASSOCIATES
GREOMA	GREENHORNE-OMARA
GRWAS	GRW AERIAL SURVEY
GSENG	GULF SOUTH ENGINEERS INCORPORATED
GSIGPS	GEOPHYSICAL SERVICE INCORPORATED
GWMSI	GEORGE W MUERY AND SON INCORPORATED
HALSEY	W H HALSEY CIVIL ENGINEERS INC
HARDEY	HARDEY ENGINEERING AND ASSOCIATES
HARMS	JOHN E HARMS JR AND ASSOCIATES INCORPORATED
HARTMN	HARTMANN ASSOCIATES INCORPORATED
HDA	HORTON DENNIS ASSOCIATES
HEIDT	HEIDT AND ASSOCIATES INCORPORATED
HGSERV	HAMILTON GEODETIC SERVICES
HHAA	HELMER HUGHS AND ASSOCIATES
HIGHC	HIGH COUNTRY ENGINEERING
HLS	HUNTER LAND SURVEYING COMPANY
HOBBS	HOBBS AND ASSOCIATES
HOFFMA	HOFFMAN AND COMPANY
HOLDEN	HOLDEN GPS

SYMBOL	FULL NAME
HOLLIN	HOLLINGSWORTH AND ASSOCIATES
HTB	HEALY TIBBITS BUILDERS
HUBBLE	HUBBLE ENGINEERING INCORPORATED
HYCAS	HYCON AERIAL SURVEY
IAMAP	INTERNATIONAL AERIAL MAPPING COMPANY
IGS	INTERNATIONAL GEODYNAMICS SERVICE
ISBELL	ISBELL CONSTRUCTION COMPANY
ITECHI	INTERNATIONAL TECHNOLOGY INCORPORATED
JUBENG	JUB ENGINEERS INCORPORATED
JAHA	JAMES H HARRIS AND ASSOCIATES
JAVAD	JAVAD POSITIONING SYSTEMS
JBB	J B BLYDENBURGH SURVEYOR
JCAND	J.C. ANDRUS AND ASSOCOATES INCORPORATED
JKPLS	JEFF KERN PROFESSIONAL LAND SURVEYOR
JOHFRA	JOHNSON-FRANK
JOHNSN	JOHNSON ENGINEERING INCORPORATED
JRENG	JR ENGINEERING LTD
KAISER	KAISER INDUSTRIES CORPORATION
KEISCH	KEITH AND SCHNARS - LAKELAND
KIMLEY	KIMLEY-HORN AND ASSOCIATES INCORPORATED
KONSKI	KONSKI ENGINEERS
LAFAVE	A LAFAVE LAND SURVEYOR
LAWNOA	LAWSON NOBLE AND ASSOCIATES
LBFH	LINDAHL BROWNING FERRARF HELLSTROM
LDA	LEWIS DICKERSON AND ASSOCIATES CONS ENG
LEAS	LIMBAUGH ENGINEERING AND AERIAL SURVEY INC
LEGER	LEGER SURVEYS INC
LEICA	LEICA INCORPORATED
LENZ	H F LENZ COMPANY
LEVITT	ITT LEVITT CORPORATION
LIETZ	THE LIETZ COMPANY
LINDSY	F M LINDSEY AND ASSOCIATES
LITTL	A E LITTLE RLS
LITTLE	OWEN LITTLE AND ASSOCIATES
LOWE	LOWE ENGINEERS
MADHOP	MADDOX AND HOPKINS SURVEYORS
MAGELL	MAGELLAN CORPORATION
MAI	MEYER AND ASSOCIATES INCORPORATED
MARCHE	MARCHESE AND SONS
MARKHU	MARKHURD
MARLOW	HARRY W MARLOW INCORPORATED
MASDIX	MASON AND DIXON
MATOTA	WILLIAM MATOTAN AND ASSOCIATES
MCCENG	MCCLELLAND ENGINEERS
MCCRON	J R MCCRONE JR INCORPORATED
MCGRIF	P C MCGRIFF COMPANY
MCTUER	MCCARTER AND TULLER INCORPORATED
MECKEL	MECKEL ENGINEERING
MELGEE	MELVIN GEE AND ASSOCIATES
MENSHA	MENASHA CORPORATION
MERCER	JOHN D MERCER AND ASSOCIATES INCORPORATED
MERRIC	MERRICK AND COMPANY
METRIC	METRIC SURVEYS
MGA	MOORE GARDNER AND ASSOCIATES
MGSINC	MINISTER AND GLAESER SURVEYING INCORPORATED
MHAS	MARK HURD AERIAL SURVEYS
MIDGA	MID GEORGIA SURVEYORS

SYMBOL	FULL NAME
MJH	MITCHELL JONES AND HARDEN INCORPORATED
MKWS	M K WELCH SURVEYS
MLI	MILLER AND LUX INC
MME	MYERS-MACOMBER ENGINEERS
MPHI	MORRIS P HEBERT INCORPORATED
MPS	MACNAMEE PORTER AND SEELEY
MSAM	MOUNTAIN SURVEYING AND MAPPING INCORPORATED
MSE	MSE CORPORATION
MSI	MEASUREMENT SCIENCE INCORPORATED
MSM	MEURER SERAFINI AND MEURER INCORPORATED (NOW MSAM)
NAVSER	NAVIGATION SERVICES INCORPORATED
NEDIVS	NORTHEAST DIVERSIFIED SERVICES INCORPORATED
NEILAN	THE NEILAN ENGINEERS INCORPORATED
NESS	NE SURVEY SERVICE
NFORK	NORTH FORK SURVEYING
NVGPS	NORTH VALLEYS GPS SERVICES
OCEGPS	OCEONICS INCORPORATED
OHM	ORCHARD HILTZ AND MCCLIMENT INCORPORATED
OMAN	OMAN CONSTRUCTION COMPANY
OMEGA	OMEGA ENGINEERING SERVICES
ORION	ORION GPS
OSBORN	ALLEN OSBORNE ASSOCIATES
PACSUR	PACIFIC SURVEY
PAS	PARK AERIAL SURVEYS INCORPORATED
PASENG	PENFIELD AND SMITH ENGINEERS
PATRIC	PATRICK ENGINEERING INCORPORATED
PGEG	PETTY GEOPHYSICAL AND ENGINEERING COMPANY
PHELPS	B E PHELPS INCORPORATED
PIEDAS	PIEDMONT AERIAL SURVEYS
PMC	PERRY C MCGRIFF COMPANY
PMGS	PHOTOGRAMMETRIC GEODETIC SURVEY
PORTER	NORMAN PORTER ASSOCIATES
PS	POSITIONING SERVICES
PRENAS	PROFESSIONAL ENGINEERING ASSOCIATES INCORPORATED
PROENG	PROFESSIONAL ENGINEERING CONSULTANTS INCORPORATED
PROFLN	PROFESSIONAL LAND SURVEYOR
R+MCON	R + M CONSULTANTS INCORPORATED
RAYONI	ITT RAYONIER INCORPORATED
RBAGB	R BRADFORD AND G BEAM
RDA	RINKER DETWILER AND ASSOCIATES
RICE	RICE ASSOCIATES PC
RSA	ROUSE-SIRINE ASSOCIATES
RUSH	RU-SH GPS CONSULTANTS AND LAND SURVEYORS
SAWENG	SAWTOOTH ENGINEERING
SBAS	SIDNEY B BOWNE AND SON
SBI	SHERWOOD BROTHERS INCORPORATED
SCAN	SCANLON AND ASSOCIATES
SCHC	THE SCHNEIDER CORPORATION
SCSC	SO CAROLINA SANTEE COOPER PS AUTHORITY
SEC	SCHNEIDER ENGINEERING CORPORATION (NOW SCHC)
SECI	SMITH ENGINEERING CONSULTANTS INCORPORATED
SECO	SOUTHERN ENGINEERING COMPANY
SELLS	CHAS H SELLS INCORPORATED CONSULTING ENGINEERS
SLSS	STEPHENSON LAND SURVEYING SERVICES
SPAN	SPAN INTERNATIONAL INCORPORATED

SYMBOL	FULL NAME
SPEAR	JAY SPEARMAN CONSULTING ENGINEERS
STEINA	STEINMAN AND ASSOCIATES
STUNTZ	STUNTZNER ENGINEERING AND FORESTRY
SUMMIT	SUMMIT ENGINEERING
SUNRIS	SUNRISE GEODETIC
SURCON	SURVCON INCORPORATED
SURSAT	SURVSAT
SURTEC	SUR-TECH INCORPORATED
SWECO	STONE WEBSTER ENGINEERING CORPORATION
TACK	TACK PROFESSIONAL LAND SURVEYING
TCIRR	TENNESSEE COAL IRON AND RAILROAD COMPANY
TE	THOMPSON ENGINEERING
THOMAS	THOMAS ENGINEERING AND SURVEYING COMPANY
TNH	TRYCK NYMAN AND HAYES
TOBIN	TOBIN INTERNATIONAL INC
TOPCON	TOPCON
TOTTEN	CARL TOTTEN ASSOCIATES
TOWILL	TOWILL INCORPORATED
TPP	T P PARKER AND SON
TRIBBL	TRIBBLE AND RICHARDSON
TRINAV	TRIMBLE NAVIGATION LIMITED
TSI	TOBIN SURVEYS INCORPORATED (NOW TOBIN)
TURNER	A E TURNER ARCHITECT
TVGA	TVGA ENGINEERING SURVEYING PC
TWM	THOUVENOT, WADE AND MOERCHEN
TWT	TAYLOR WISEMAN AND TAYLOR CONSULTING ENGINEERS
URS	URS COMPANY
USKCE	UNWIN-SCHEBAN-KORYNTA CONS ENG
VFM	VERNON F MEYER AND ASSOCIATES INCORPORATED
VJV	V J VANLINT CONSULTING ENGINEER
VOGI	VOGI IVERS AND ASSOCIATES
WAA	WALKER AND ASSOCIATES INCORPORATED
WADTRI	WADE-TRIM INCORPORATED
WALASS	WALLACE AND ASSOCIATES
WARD	E J WARD
WAWHI	WALKER AND WHITEFORD INCORPORATED
WBCC	WARREN BROTHERS CONSTRUCTION COMPANY
WESGEO	WESTERN GEOPHYSICAL COMPANY OF AMERICA
WEVACO	WEST-VACO CORPORATION
WEYCO	WEYERHAEUSER COMPANY
WFTA	W F TURNEY AND ASSOCIATES
WHGAI	WILLIAM H GORDON ASSOCIATES INCORPORATED
WHPCO	W H PORTER AND COMPANY INCORPORATED
WIMPOL	WIMPOL INCORPORATED
WOOLPT	WOOLPERT CONSULTANTS
WRA	WHIGMAN AND REQUARDT ASSOCIATES
WSA	WILLIAMS AND STACKHOUSE ASSOCIATES
XYZGPS	THE XYZS OF GPS INCORPORATED
YOUNG	GEORGE F YOUNG INCORPORATED
ZENA	ZENA COMPANY (ZEISS-JENA DISTR UNITED STATES)
ZYLSTR	ZYLSTRA-BAKER SURVEYING INCORPORATED

EDUCATIONAL INSTITUTIONS

SYMBOL	FULL NAME
AUBURN	AUBURN UNIVERSITY
BMS	BOSTON MUSEUM OF SCIENCE
BNL	BROOKHAVEN NATIONAL LABORATORY
BSCOL	BISMARCK STATE COLLEGE
CBI	CONRAD BLUCHER INSTITUTE FOR SURVEY AND SCIENCE
CLEMU	CLEMSON UNIVERSITY
CORUNI	CORNELL UNIVERSITY
CU	COLUMBIA UNIVERSITY
FSNSCH	FARMINGTON STATE NORMAL SCHOOL
GATECH	GEORGIA INSTITUTE OF TECHNOLOGY
IASUNI	IOWA STATE UNIVERSITY
INU	INDIANA UNIVERSITY
JPL	JET PROPULSION LABORATORY
KSU	KANSAS STATE UNIVERSITY
LAFCO	LAFAYETTE COLLEGE
LAHSCH	LOS ALTOS HIGH SCHOOL
LASLAB	LOS ALAMOS SCIENTIFIC LABORATORIES
LASU	LOUISIANA STATE UNIVERSITY
LAWRRI	LOUISIANA WATER RESOURCE RESEARCH INSTITUTE
LEHIGH	LEHIGH UNIVERSITY
MERCU	MERCER UNIVERSITY
MISCOL	MICHIGAN STATE COLLEGE
MIT	MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MITU	MICHIGAN TECHNICAL UNIVERSITY
MSSU	MISSISSIPPI STATE UNIVERSITY
MSU	UNIVERSITY OF MISSISSIPPI
MUNIV	MARQUETTE UNIVERSITY
NDSU	NORTH DAKOTA STATE UNIVERSITY
NMSU	NEW MEXICO STATE UNIVERSITY
ODU	OLD DOMINION UNIVERSITY
ORTI	OREGON TECHNICAL INSTITUTE
PEABMA	PEABODY MUSEUM AWATOVI
PMAE	PEABODY MUSEUM OF ARCHEOLOGY AND ETHNOLOGY
SCEC	SOUTHERN CALIFORNIA EARTHQUAKE CENTER
SCRIPP	SCRIPPS INSTITUTE OF OCEANOGRAPHY
SCT	SOUTHERN COLLEGE OF TECHNOLOGY
SOPOST	SOUTHERN POLYTECHNIC STATE UNIVERSITY
SUNIV	STANFORD UNIVERSITY
TCU	TEXAS CHRISTIAN UNIVERSITY
TUM	TECHNICAL UNIVERSITY OF MUNICH GERMANY
UALR	UNIVERSITY OF ARKANSAS AT LITTLE ROCK
UC	UNIVERSITY OF CALIFORNIA
UDE	UNIVERSITY OF DELAWARE
UFL	UNIVERSITY OF FLORIDA
UGA	UNIVERSITY OF GEORGIA
UHI	UNIVERSITY OF HAWAII
UID	UNIVERSITY OF IDAHO
ULAVAL	UNIVERSITY LAVAL QUEBEC
UMPQU	UMPQUA COMMUNITY COLLEGE
UNAVCO	UNIVERSITY NAVSTAR CONSORTIUM

EDUCATIONAL INSTITUTIONS - CONTINUED

SYMBOL	FULL NAME
UNC	UNIVERSITY OF NORTH CAROLINA
UNM	UNIVERSITY OF NEW MEXICO
UNO	UNIVERSITY OF NEW ORLEANS
UOFSC	UNIVERSITY OF SOUTHERN COLORADO
USC	UNIVERSITY OF SOUTHERN CALIFORNIA
UTU	UNIVERSITY OF UTAH
UTX	UNIVERSITY OF TEXAS
UVA	UNIVERSITY OF VIRGINIA
UVC	UNIVERSITY OF VIRGINIA CONSERVANCY
UVT	UNIVERSITY OF VERMONT
UWA	UNIVERSITY OF WASHINGTON
UWI	UNIVERSITY OF WISCONSIN
WCC	WESTERN COMMUNITY COLLEGE
WILCO	WILLIAMS COLLEGE AT WILLIAMSTOWN MASSACHUSETTS
WVUNI	WEST VIRGINIA UNIVERSITY

PROFESSIONAL AND AMATEUR ASSOCIATIONS

SYMBOL	FULL NAME
BSA	BOY SCOUTS OF AMERIC
ECM	ENGINEERS CLUB OF MEMPHIS
FSPLS	FL SOCIETY PROF LAND SURVEYORS
ILRLSA	ILLINOIS REGISTERED LAND SURVEYORS ASSOCIATION
LALSA	LOUISIANA LAND SURVEY ASSOCIATION
NVALS	NEVADA ASSOCIATION OF LAND SURVEYORS
PLSO	PROFESSIONAL LAND SURVEYORS OF OHIO
SCSRLS	SOUTH CAROLINA SOCIETY OF REGISTERED LAND SURVEYORS
SWNMS	SOUTHWEST NEW MEXICO SURVEYORS
USPSQD	UNITED STATES POWER SQUADRON
WALSA	WASHINGTON LAND SURVEYORS ASSOCIATION

MISCELLANEOUS COMMERCIAL ORGANIZATIONS AND PRIVATE FIRMS

SYMBOL	FULL NAME
AKGEO	ALASKAN GEOPHYSICAL
AKLPCO	ALASKA LUMBER AND PULP COMPANY
ATCO	ASSOCIATED TRACTION COMPANY
ATT	AMERICAN TELEPHONE AND TELEGRAPH COMPANY
BGCO	BROWN GEOPHYSICAL COMPANY
BOECOM	BOEING COMPANY
BULE	BULE AND ASSOCIATES
BW	BRADFORD WASHBURN
BWCO	BONO-WILLIAMS COMPANY
CCCC	CARBIDE AND CARBON CHEMICALS CORPORATION
CCICO	CLEVELAND CLIFFS IRON COMPANY
CLA	CROZER LAND ASSOCIATION
CPFC	CHAMPION PAPER AND FIBER COMPANY
CPI	CINCINNATI PRECISION INSTRUMENT COMPANY
CROSET	CROSSETT LUMBER COMPANY
CZOP	CZOP/SPECTER INCORPORATED

SYMBOL	FULL NAME
DBA	DBA SYSTEMS INCORPORATED
DFWIAP	DALLAS-FORT WORTH INTERNATIONAL AIRPORT
DOWCO	DOW CHEMICAL COMPANY
DSI	DESIGN SCIENCES INCORPORATED
DVLCO	DOLLY VARDEN LUMBER COMPANY
ENVENG	ENVIRONMENTAL ENGINEERING INCORPORATED
FMCO	FORD MOTOR COMPANY
GCC	GLOGORA COAL COMPANY
GE	GENERAL ELECTRIC CORPORATION
GEON	GEONAUTICS INCORPORATED
GPI	GREENMAN PEDERSEN INCORPORATED
GRDC	GULF RESEARCH AND DEVELOPMENT COMPANY
GWA	GERKEN WOOD AND ASSOCIATES INCORPORATED
HAPT	HUGHES AIRPORT
HMB	HANNON MEEKS AND BAGWELL
HMCO	HANNA MINING COMPANY
ISSINC	INSTRUMENT SALES AND SERVICES INCORPORATED
JUNK	C.W. JUNKINS ASSOCIATES INCORPORATED
KETCH	KETCHIKAN PULP COMPANY
LAICO	LOS ANGELES INVESTMENT COMPANY
LDGO	LAMONT DOHERTY GEOLOGICAL OBSERVATORY
LEICA	LEICA INCORPORATED
LUND	LUND PARTNERSHIP
MACCO	MACCO CORPORATION
MCAM	MOLYBDENUM CORPORATION OF AMERICA
MCLCO	MICHIGAN-CALIFORNIA LUMBER COMPANY
MLGW	MEMPHIS LIGHT GAS AND WATER
NAAV	NORTH AMERICAN AVIATION
NJZINC	NEW JERSEY ZINC COMPANY
NWHYDR	NORTHWEST HYDRAULIC CONSULTANTS
PACTT	PACIFIC TELEPHONE AND TELEGRAPH COMPANY
PANAM	PAN AMERICAN AIRLINES
PCC	PEABODY COAL COMPANY
PECO	POHLY EXPLORATION COMPANY
PHILCM	PHILLIPS CHEMICAL COMPANY
PPCC	PACIFIC PORTLAND CEMENT CORPORATION
PSOMAS	PSOMAS AND ASSOCIATES
PVE	PALOS VERDES ESTATES
REGIS	ST REGIS PAPER COMPANY
RRLC	RED RIVER LUMBER COMPANY
RETTEW	RETTEW ASSOCIATES
SAGECO	SAGE CONSULTANTS
SANDIA	SANDIA CORPORATION
SLDC	SAINT LAWRENCE DEVELOPMENT CORPORATION
SSC	SEISMOGRAPH SERVICE CORPORATION
STATEL	STANFORD TELECOM
SWBELL	SOUTH WESTERN BELL TELEPHONE COMPANY
TLDYNE	TELEDYNE INCORPORATED
TTAG	TITAN ATLANTIC GROUP
VAILCO	VAIL COMPANY
VITRO	VITRO CORPORATION (NOW VITSER)
VITSER	VITRO SERVICES CORPORATION
WE	WESTERN ELECTRIC COMPANY
WELCHC	WELCH COMER AND ASSOCIATES
WHITE	WHITE PIGMENT COMPANY

NON-SPECIFIC DESIGNATORS

SYMBOL	FULL NAME
LOCENG	LOCAL ENGINEER (INDIVIDUAL OR FIRM)
LOCSUR	LOCAL SURVEYOR (INDIVIDUAL OR FIRM)
UNK	UNKNOWN PERSON OR FIRM

ANNEX D

GUIDELINES FOR GEODETIC CONTROL POINT DESIGNATIONS

A geodetic control point is a monumented or otherwise marked, survey point, established for the purpose of providing geodetic reference for mapping and charting activities and for a wide variety of engineering and scientific applications. A control point is normally identified by a number, an alphanumeric symbol, or a concise, intelligible name which is usually stamped on the disk marker. In principle, the designation by which a control point is identified should closely resemble the stamping that appears on the respective marker. However, extraneous information is frequently present which should not be included as part of the designation. In every case, the designation assigned to a control point for processing purposes must be identical to the designation that appears in the heading of the station description.

These guidelines have been established to provide consistent control point designations and facilitate automated processing of the data. Implementation of these guidelines may sometimes result in two or more control points having the same designation. In such cases it will be necessary to refer to other information in the description to completely identify the control point. Sample formats for the various designations are given in this annex.

GUIDELINES

1. A control point designation must not exceed 40 alphanumeric characters, including all imbedded blanks. When necessary, abbreviate and/or edit an existing designation to conform to this limit.

2. The year the mark was set is considered extraneous information and is not to be carried as part of a control point designation. For marks whose designations have not been altered when they were reset, the word RESET must be appended to the original designations. This also holds true for control points which have been reset more than once. In such cases the year given in the "year set" field will be used to distinguish the marks.

Monument	Stamped	Designation
USGS BM Disk	TT 8 RESET 1965	TT 8 RESET
CGS BM Disk	LAKE WASHINGTON RESET 1970	LAKE WASHINGTON RESET
CGS Tri Sta Disk	BRADY 1951	BRADY
CGS BM Disk	ONEAL 1 1954	ONEAL 1
CGS BM Disk	DE KALB 1934	DEKALB
NCGS Trav Sta Disk	MC CALL 1968	MCCALL
CGS Tri Sta Disk	DODGE 2 1969	DODGE 2
CGS Tri Sta Disk	SPIT 1953 1983	SPIT RESET
USGS Survey Disk	PRIM TRAV STA NO 185 1915	PTS 185

3. The acronym or abbreviation of the agency or organization whose name is precast or sometimes stamped in the survey marker is considered extraneous information and should not be included in the control point designation.

Monument	Stamped	Designation
FLGS BM Disk	203 RESET 1950	203 RESET
FLGS BM Disk	203 RESET 1967	203 RESET
FLGS BM Disk	203 RESET 1967 MAY	203 RESET MAY
USGS BM Disk	2903	2903
MORC Gaging Sta	GAGING STA	GAGING STA
RIRR Disk	RV 16	RV 16
USGS Chis Square		WO 23 RM=148 RM
USGS Survey Disk	WO 23 1933	WO 23
USGS Survey Disk	WO 23 1933 RESET 1962	WO 23 RESET
PP+L Survey Disk	P 11 PPL RESET 1976	P 11 RESET

4. The following special characters are the only ones allowed in a control point designation. They are the blank ( ), plus (+), minus or hyphen (-), equals (=), slash (/), and decimal point (.). When used, these special characters must not be separated from adjacent characters by any blanks. Commas and parentheses are not allowed within a designation.

4.1 Most alpha and numeric character groupings in a designation should be separated by a single blank ( ). Some exceptions are allowed, see the set of Abbreviations and Formats.

Monument	Stamped	Designation
USGS Survey Disk	TT17B	TT 17 B
USGS Survey Disk	TT-17B	TT 17 B
USGS Survey Disk	TT-1 7B	TT 1 7 B

4.2 A plus sign (+) is permitted within a designation when the control point was previously used for stationing in alignment surveys. In these cases the plus sign (+) must be immediately preceded and followed by a digit, not a blank.

Monument	Stamped	Designation
AZDT Disk	STATION 11+14	ROUTE 244 STA 11+14
Highway Disk	2623 + 00	I95 STA 2623+00

4.3 The minus or hyphen (-) is allowed only when indicating a negative elevation stamped on a mark. An elevation stamped on a mark is used as the designation only when there is no other means to identify the mark. When a minus or hyphen (-) is used, it must be the first character of the designation and must be immediately followed by a digit.

Monument	Stamped	Designation
USGS Nail (Tag)	-227.10 5-23-55	-227.10
CGS BM Disk	-193.097 F 70 1928	F 70
USGS BM Disk	ELEV -7.325 FT	-7.325

4.4 The equal sign (=) is used as a separator for control points which carry multiple stamped designations. The designations involved should be concatenated with the equal sign. The combined designation length must not exceed the 40-character limit and the designation preceding the equal sign should be the designation used by the originating agency.

Monument	Stamped		Designation
USGS Chis Square			WO 23 RM=148 RM
CADH Survey Disk	CH 1174	297+00 (A)	CH 1174=297+00 A
Unk Survey Disk	STA. NO. 3	MI. 182.5	STA 3=MI 182.5
CGS Ref Mark Disk	LEE NO 1 1932	R 13	LEE RM 1=R 13
CGS Tri Sta Disk	68.399 B 22	ATKINSON 1918	ATKINSON=B 22
USGS Cap	U 276 1942	VA 45 1917	45=U 276

NOTE: In situations where there are multiple designations that either do not appear stamped on the mark or are too long to be accommodated by the 40-character designation, the secondary designation may be given as a separate data item and carried as an alias in the appropriate field.

4.5 A slash (/) may be used to indicate a numerical fraction.

Monument	Stamped	Designation
USGLO Survey Disk	T1N R3E S35 S36 1/4 1943	T1N R3E SECS 35 36 1/4 COR

4.6 A period (.) may not appear imbedded in or adjacent to a grouping of alpha characters, but may be used as a decimal point if imbedded in (but not adjacent to) a grouping of numeric characters.

Monument	Stamped	Designation
MADPW Survey Disk	ELEV. B.M. NO. F 40	F 40
CGS Ref Mark Disk	W. BASE NO 4 1965	CHARLESTON W BASE RM 4
CADWR Survey Disk	MI. 0.9 1967	AMERICAN CANAL MI 0.9
CGS Tri Sta Disk	PALMER N.E. BASE	PALMER NE BASE
CGS BM Disk	MT. MORRIS 1941	MT MORRIS

5. Nonspecific descriptive terms are not to be treated as "double designations" and are not to be carried as aliases.

Published as	Stamped	Designation
BENCH MARK 2		2
114.3, Chis Square		114.3
C 1, Bolt		C 1

6. The characters "BM", "BENCH MARK", and "PBM", even when stamped on a disk, are not to be included in a designation unless the control point has no other stamping (e.g., BM USGS) or the characters "BM" do not represent the words "BENCH MARK."

7. The elevation stamped on the disk marker on the monument is not to be carried as a part of the respective designation. The exception is when the elevation is the only means of identifying the survey mark.

Monument	Stamped	Designation
CGS BM Disk	H 325 230.695FT	H 325
MORC Disk	140B ELEV 95.3 FT	140 B
USGS BM Disk	-9.825 FT	-9.825
BOR Survey Disk	ELEV. 101.6	101.6

8. The characters "NO" or "No.", when used as an abbreviation for the word "number", should not be included in the designation, even when they are stamped in the disk.

Monument	Stamped	Designation
CGS Ref Mark Disk	MONROE NO 1 1944	MONROE RM 1
CGS BM Disk	BENCH MARK No. 6	6

9. The designation for a reference mark disk should be formed by appending the symbols RM 1, RM 2, ..., RM 13, etc. to the name of the horizontal control point for reference marks stamped NO 1, NO 2, ..., NO 13, etc., respectively.

Monument	Stamped	Designation
CGS Ref Mark Disk	CHARLOTTE NO. 1 1945	CHARLOTTE RM 1
CGS Ref Mark Disk	BOULDER 1935 NO 6 1968	BOULDER RM 6
CGS Ref Mark Disk	CHICO 1948 NO 3 RESET 1971	CHICO RM 3 RESET

10. The designation for an azimuth mark disk is formed by appending the characters "AZ MK" to the name of the respective horizontal control point. In the case of multiple azimuth marks, the numbers "2", "3", etc. are added for azimuth marks stamped NO 2, NO 3, etc.

Monument	Stamped	Designation
CGS Az Mark Disk	CHARLOTTE 1934	CHARLOTTE AZ MK
CGS Az Mark Disk	BOULDER 1935 NO. 3	BOULDER AZ MK 3
CGS Az Mark Disk	NORWASH AZI 1932	NORWASH AZ MK
CGS Az Mark Disk	PARK AZ RESET 1965	PARK AZ MK RESET

11. A temporary bench mark (TBM) must carry the letters "TBM" as the first three characters of the designation.

Monument	Stamped	Designation
Spike		TBM 1 A
Sidewalk		TBM 14

12. The National Ocean Service (NOS) has instituted a standard system of designations for all tidal and water level stations operated by NOS. The system provides for the unique identification of all disks, staffs, etc., located at such stations (e.g., see Formats in this annex).

Tidal and water level bench mark designations must conform to standard designations adopted by the National Ocean Service. For information concerning specific tide gage bench marks, etc., communicate with:

NOAA, National Ocean Service
OPSD, User Services, N/CS44
Attn: Water Levels
1305 East-West Highway
Silver Spring, MD 20910-3281

Telephone: 1-301-713-2877 ext. 176
E-mail Address: lyles@wlnet.nos.noaa.gov
Internet Web Site: www.opsd.nos.noaa.gov

Whenever the need arises for a guideline to deal with a situation not covered herein, the user is encouraged to communicate with the following technical office in NGS:

Spatial Reference System Division, N/NGS2
National Geodetic Survey, NOAA
1315 East-West Highway
Silver Spring, MD 20910-3282

Telephone: 1-301-713-3191
E-mail Address: edm@ngs.noaa.gov
Internet Web Site: www.ngs.noaa.gov

ABBREVIATIONS

A list of standard abbreviations has been adopted for use in designating geodetic control points. These abbreviations are for terms that commonly occur in designations and are the only accepted forms of abbreviation. This list may be extended as the need arises.

Geodetic control point abbreviations

A POINT	A PT
ACADEMY	ACAD
ADMINISTRATION	ADM
AGENCY	AGY
AGRICULTURE	AGRI
AHEAD	AHD
AIRCRAFT	ARCFT
AIRPORT	APT
AIRWAY	AWY
AIR FORCE BASE	AFB
ALLEGHENY	ALGHNY
AMBASSADOR	AMB
AMENDED	AMD
AMENDED MONUMENT (AM)	AMD MON
AMERICAN	AMER
ANGLE	ANG
ANGLE POINT (AP)	ANG PT
ANTENNA	ANT
APPALACHIAN	APLCN
APPROXIMATELY	APPROX
ASSOCIATION	ASSOC
ASTRONOMICAL	ASTRO
ASYLUM	ASY
ATLANTIC	AT
AUTHORITY	AUTH
AUXILIARY	AUX
AUXILIARY MEANDER CORNER (AMC)	AUX MDR COR
AVENUE	AVE

Notes:

1. Abbreviations listed with () are used by the Bureau of Land Management.
2. The cardinal directions (E, S, W, N, NE, SE, SW, and NW) are to be abbreviated only when they are not the first word of the designation.

Geodetic control point abbreviations (Continued)

AVIATION	AVN
AZIMUTH	AZ
BACK	BCK
BANK	BK
BANKING	BKG
BAPTIST	BAP
BATTERY	BTRY
BEACON	BCN
BEARING	BRG
BEARING OBJECT (BO)	BRG OBJ
BEARING TREE (BT)	BRG TREE
BELFRY	BFRY
BETWEEN	BET
BOULEVARD	BLVD
BOUNDARY	BDRY
BREAKWATER	BRKWTR
BRICK	BR
BROADCASTING	BCSTG
BROTHER	BRO
BROTHERS	BROS
BUILDING	BLDG
BUREAU	BUR
CAPITOL	CAP
CATHEDRAL	CATHL
CATHOLIC	CATH
CEMETERY	CEM
CENTER (C)	CEN
CENTERLINE	CL
CERAMIC	CERAM
CHEMICAL	CHEM
CHIMNEY	CHIM
CHURCH	CH
CLOCK	CLK
CLOSING CORNER (CC)	CC
COLLEGE	COLL
COMMERCE	COM
COMMERCIAL	COML
COMMISSION	COMM
COMPANY	CO
COMPRESS	COMP
CONCENTRATION	CONCN
CONCEPTION	CON
CONCRETE	CONC
CONGREGATIONAL	CONG

Geodetic control point abbreviations (Continued)

CONSOLIDATED	CONSOL
CONSTRUCTION	CONSTR
CONTINENTAL	CONTL
CONTROL	CTRL
COOPERATIVE	COOP
CORNER	COR
CORPORATION	CORP
CORRECTIONAL	CORR
COUNTRY	CTRY
COUNTY	CNTY
COURTHOUSE	CTHSE
CUPOLA	CUP
DAYBEACON	DBCN
DEFENSE	DEF
DEPARTMENT	DEPT
DISTRIBUTOR	DISTR
DIVISION	DIV
DOMESTIC	DOM
DORMITORY	DORM
DRAWBRIDGE	DBRIDGE
EAST	E
ECCENTRIC	ECC
EDUCATION	EDUC
ELECTRIC	ELEC
ELEMENTARY	ELEM
ELEVATION	ELEV
ELEVATED	ELEVD
ELEVATOR	ELEVR
ENGINEERING	ENG
ENGRAVING	ENGR
ENTRANCE	ENTR
EPISCOPAL	EPIS
EQUIPMENT	EQPT
EVANGELICAL	EVAN
EXCHANGE	EXCH
EXPERIMENTAL	EXPTL
FEDERAL	FED
FINIAL	FIN
FIRST	1ST
FLAGPOLE	FP
FLAGSTAFF	FS
FOURTH	4TH
FRONT RANGE	FRGE
FURNITURE	FURN

Geodetic control point abbreviations (Continued)

GABLE	GAB
GENERAL	GEN
GEODETIC	GEOD
GEOGRAPHIC	GEOG
GEOLOGICAL	GEOL
GOVERNMENT	GOVT
GROWERS	GROS
HARBOR	HBR
HARDWARE	HDWE
HEADQUARTERS	HQ
HEIGHTS	HTS
HIGHWAY	HWY
HISTORICAL	HIST
HOSPITAL	HOSP
HOUSE	HSE
HYDRO	HYD
IMMACULATE	IMM
IMPLEMENT	IMPL
IMPORT	IMP
INCINERATOR	INCIN
INCORPORATED	INC
INDEPENDENT	IND
INDUSTRIAL	INDL
INDUSTRY	INDY
INFIRMARY	INFIRM
INSTITUTE	INST
INSTITUTION	INSTN
INSURANCE	INS
INTERNATIONAL	INTL
INTERSTATE	INTST
INTERSECT	INT
INVESTMENT	INVT
IRRIGATION	IRRIG
ISLAND	IS
JUNCTION	JCT
LABORATORY	LAB
LANDING	LDG
LATITUDE	LAT
LATTER DAY SAINTS	LDS
LEATHER	LEA
LEFT	LT **

**The abbreviations R, T, LT, and RT must be adjacent to at least one numeric character.

Geodetic control point abbreviations (Continued)

LIGHT	LT
LIGHTHOUSE	LH
LOCAL	LCL
LOCATION	LOC
LOCATION MONUMENT (LM)	LOC MON
LOOKOUT	LO
LOOKOUT HOUSE	LOH
LOOKOUT TOWER	LOT
LONGITUDE	LON
LUMBER	LUM
LUTHERAN	LUTH
MACHINERY	MACH
MAGAZINE	MAGZ
MAGNETIC	MAG
MAINTENANCE	MAINT
MANUFACTURED	MFD
MANUFACTURING	MFG
MARK	MK
MARKET	MKT
MAST	MST
MEANDER	MDR
MEANDER CORNER (MC)	MDR COR
MERCHANDISE	MDSE
MERCANTILE	MERC
METHODIST	METH
METROPOLITAN	MET
MICROWAVE	MV
MILE or MILES	MI
MILEPOST	MP
MILITARY	MIL
MILLING	MILL
MONUMENT	MON
MOUNT	MT
MOUNTAIN	MTN
MUNICIPAL	MUN
MUSEUM	MUS
NATIONAL	NAT
NAVIGATION	NAV
NEAR	NR
NORTH	N
NORTHEAST	NE
NORTHWEST	NW
OBJECT	OBJ
OBSERVATION	OBS

Geodetic control point abbreviations (Continued)

OBSERVATORY	OBSY
OBSTRUCTION	OBSTR
OFFICE	OFF
ORDNANCE	ORD
ORGANIZATION	ORG
ORTHODOX	ORTH
PEAK	PK
PENINSULA	PEN
PETROLEUM	PET
PINNACLE	PCLE
PLANT	PLT
POINT	PT
POINT A	PTA
POINT OF CURVE	POC
POINT OF INTERSECTION	PI
POINT OF TANGENT	POT
POLICE	POL
POWER	PWR
POWERHOUSE	PHSE
PRESBYTERIAN	PRESB
PRIMARY	PRIM
PRIMARY TRAVERSE STATION	PTS
PRINTING	PTG
PROCESS	PRCS
PRODUCING	PRODG
PRODUCT	PROD
PROPERTIES	PROP
PROTESTANT	PROT
PUBLIC	PUB
PUBLISHING	PUBG
QUARTER	QTR
RADIO	RAD
RAILROAD	RR
RAILWAY	RWY
RANGE	RGE
RANGE (Township)	R **
REAR RANGE	RRGE
REFERENCE	REF
REFERENCE MARK	RM
REFERENCE MONUMENT (RM)	REF MON
REFERENCE POINT	RP

**The abbreviations R, T, LT, and RT must be adjacent to at least one numeric character.

Geodetic control point abbreviations (Continued)

REFINING	REFG
REFORMED	REFM
REFRIGERATING	REFRIG
RESET	RST
RIGHT	RT **
RIGHT OF WAY	ROW
ROAD	RD
ROMAN	ROM
ROUTE	RTE
RUNWAY	RNWY
SAINT	ST
SANITARY	SANIT
SANITORIUM	SAN
SAVINGS	SVGS
SCHOOL	SCH
SCHOOLHOUSE	SCHSE
SCIENTIFIC	SCI
SECOND	2ND
SECTION	SEC
SECTIONS	SECS
SEMINARY	SEM
SERVICE	SERV
SOCIETY	SOC
SOUTH	S
SOUTHEAST	SE
SOUTHWEST	SW
SPECIAL	SPL
SPECIAL MEANDER CORNER (SMC)	SPL MDR COR
SPIRE	SP
SQUARE	SQ
STACK	STK
STANDARD	STD
STANDARD CORNER (SC)	SC
STANDPIPE	SPIPE
STATION	STA
STEEPLE	STPE
STORAGE	STGE
STREET	STR
SUBURBAN	SUBR
SUPERINTENDENT	SUPT
TANK	TK

**The abbreviations R, T, LT, and RT must be adjacent to at least one numeric character.

Geodetic control point abbreviations (Continued)

TANGENT	TAN
TANGENT OFFSET	TOS
TECHNICAL	TECH
TELEGRAPH	TELG
TELEPHONE	TEL
TELEVISION	TV
TEMP POINT A	TP A
TERMINAL	TERM
TERRITORY	TERR
THEOLOGICAL	THEO
THIRD	3RD
TOWER	TWR
TOWNSHIP	TWP
TOWNSHIP (Tier)	T **
TRACT	TR
TRANSCONTINENTAL	TRANSCON
TRANSMISSION	TRANSM
TRANSPORTATION	TRANSP
TRAVERSE	TRAV
TRAVERSE STATION	TS
TRIANGLE	TRI
TURNPIKE	TPK
UNITARIAN	UNIT
UNIVERSITY	UNIV
VACUUM	VAC
VERTEX	VTX
VILLAGE	VIL
WATER	WT
WEST	W
WAREHOUSE	WHSE
WINDMILL	WMILL
WITNESS CORNER (WC)	WC
WITNESS POST (WP), wood	WP
WITNESS POST, metal	MWP
WITNESS POST, fiberglass	FWP

**The abbreviations R, T, LT, and RT must be adjacent to at least one numeric character.

FORMATS

Only NGS employees and agents may set brass disks and aluminum flanges precast with NGS logo. Such marks must be stamped with designations supplied by the agency. Each geodetic control point designation should be unique among all the designations located within a defined region.

FORMAT: NAME SPECIAL

1. NAME

   A. The following method is generally used for naming vertical control points (bench marks). The first mark established in a state is designated "A", then "B" and so on through the alphabet, except the letters "I" and "O" which are not used because they are too easily confused with the numbers "1" and "O". The next series of marks is identified as "A 1", "B 1", etc.; then "A 2", "B 2", etc., and so on through the alphabet. In some cases, more than one letter is used to distinguish between bench marks that have accidentally been given the same name in the same state.

   B. The following method is generally used for naming a horizontal control point (triangulation or traverse). The name should serve not only to identify the station but to suggest the local geographic location or feature. The name should be used only once within a county and preferably a given state. Therefore, use sufficient variety to avoid duplication. A short name is desirable, but if a longer name is required to properly serve the purpose, it should be used. In those cases where a well known geographical feature in the vicinity is used, or the name of a local landowner, the name should be spelled correctly.

2. SPECIAL USE

   A. These terms are used with vertical control points to distinguish between names used more than once in a state or to indicate disturbance of the original bench mark (e.g., "RESET").

   B. These terms are used with horizontal control points to explain a local use or disturbance to the original mark or its designation.

Examples:

Geodetic control points

NAME		SPECIAL
Station	Number	Use
A		
L	690	
L	690	RESET
YY	1150	
C	1244	X
LEON		
LEON		ECC
LEON		RESET
LEON	RM 1	
LEON	RM 2	
LEON	AZ MK	
LEON	AZ MK	RESET
LEON	AZ MK	PTA
LEON	AZ MK 2	
LEON 2		
LEON 2	RM 3	
LEON 2	RM 4	
LEON 2	AZ MK	
LEON 2	AZ MK 2	

Tide station bench marks

FORMAT: LOCATION OBJECT SPECIAL

1. LOCATION Code and Station

   A. The location has two parts, the first part, the CODE, is a 3-digit State code given for each geographical region.
   B. The second part of the location, the STATION NUMBER, is an unique 4-digit number assigned to a particular tide station within a given geographical area.

2. OBJECT Identification

   A. The MARK USE gives information on the nature of the object which was used.
   B. The PUBLICATION NAME is used to give the proper identification of the object. In most cases, this field should be based on the stamping. If there is no stamping, use the name given in the tidal publication. In either case, this field is subject to the guidelines given in this Annex.

3. SPECIAL Use

   This term is used to explain a local use or disturbance to the original mark.

   NOTE: If other types of marks are used in tidal surveys, see other format rules for their primary designations; and add aliases according to the following examples:

Mark type	DS (Triangulation Station Mark)
Stamping	BREACH 1963
Primary designation	BREACH
Alias	866 5552 TIDAL

Mark type	DB (Bench Mark Disk)
Stamping	V 163 RESET 1984
Primary designation	V 163 RESET
Alias	872 9871 TIDAL

Examples

Tide station bench marks set before or about 1976

LOCATION		OBJECT		SPECIAL
Code State	Station No.	Mark use	Identification Publication name	Use
866	1684	TIDAL	HB 1	
857	4680	TIDAL	BASIC	
872	0030	TIDAL	37	RESET
944	0886	TIDAL	USE 5	

Tide station bench marks set after about 1976

LOCATION		OBJECT		SPECIAL
Code State	Station No.	Identification Publication name	Mark use	Use
872	0051	D	TIDAL	
872	9554	C	TIDAL	RESET

Staffs or electric tape gage (ETG) reading marks
at tide or water-level stations

FORMAT: TEMPORAL LOCATION OBJECT SPECIAL

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1. TEMPORAL Reference

   The Temporal Reference is identified by setting the term "TBM" in front of the location.

2. LOCATION Code and Station

   A. The location has two parts, the first, the CODE, is either a 3-digit STATE number code for a State or a 3-digit CUTTER code for defining a part of a lake or channel.
   B. The second part of the location, the STATION NUMBER, is an unique 4-digit number assigned to a particular tide or water level station within a given geographical area.

3. OBJECT Identification

   The Object Identification gives information on the nature of the object that was used.

4. SPECIAL Use
   These terms are used to indicate the graduation of the tide or water level staff on which the level rod was placed.

Examples

Staffs located at tide stations

TEMPORAL	LOCATION		OBJECT	SPECIAL
Reference	Code State	Station No.	Identification	Use
TBM	872	2029	STAFF	6 FT

Electric (or "zero electric") tape gage reading marks at tide stations

TEMPORAL	LOCATION		OBJECT	SPECIAL
Reference	Code State	Station No.	Identification	Use
TBM	872	9678	ETG READ MK	

Staffs located at water level stations

TEMPORAL	LOCATION		OBJECT	SPECIAL
Reference	Code Cutter	Station No.	Identification	Use
TBM	906	3000	STAFF	6 FT

Electric tape gage (ETG) reading marks at water level stations

TEMPORAL	LOCATION		OBJECT	SPECIAL
Reference	Code Cutter	Station No.	Identification	Use
TBM	907	5099	ETG READ MK	

Water level station bench marks

FORMAT: LOCATION OBJECT SPECIAL

1. LOCATION Code and Station

   A. The first part of the location is the 3-digit code for defining a part of a lake or channel within the CUTTER Code System.
   B. The second part of the location, the STATION NUMBER, is a unique 4-digit number assigned to the water level station within a given geographical area.

2. OBJECT Identification

   In most cases, this field should be based on the stamping. If there is no stamping, use the name given in the water level publication. In either case, this field is subject to the guidelines given in this annex.

3. SPECIAL Use

   These character strings are used to explain some local use or disturbance to the original mark.

   NOTE: If other types of marks are used in water level surveys, see other format rules for their primary designation and add an alias according to the following example:

Mark type	F	(flange-encased rod)
Stamping	C 234 1980	(on logo cap)
Primary designation	C 234	
Alias	906 3087	

Examples

Water level station bench marks set before or about 1976

LOCATION		OBJECT	SPECIAL
Code Cutter	Station No	Identification	Use
907	5098	ROAD A	
907	5098	ROAD A	RESET

Water level station bench marks set after about 1976

LOCATION		OBJECT	SPECIAL
Code Cutter	Station No.	Identification	Use
907	5085	F	
907	5085	F	RESET

FORMAT: ALIGNMENT OBJECT LOCATION SPECIAL

1. ALIGNMENT Survey Name

   Use the proper NAME of the town, city, or a geographic location within the area for the airport.

2. OBJECT Identification

   Enter the type of alignment object, in this case it is the airport RUNWAY.

3. LOCATION Station (Runway Number) and Tangent Offset (TOS)

   A. The location has two parts, the first part is called the runway number and should be a 2-digit numerical value. These two digits are taken from the first two digits of the 3-digit runway (measured from north) azimuth, i.e., 01, 13, 22, or 34 which were taken from the azimuths of 010, 130, 220, and 340 respectively.

   B. The second part of the location, the tangent offset (TOS), is the location of the control point in question with respect to the center of the alignment, that is, the distance (in meters/feet) either left or right.

4. SPECIAL Use

   Terms such as A PT, ECC, HUB, PTA, RESET, and TP A are used to explain a local use or disturbance to the original mark.

Examples

Airport runways

ALIGNMENT	OBJECT	LOCATION		SPECIAL
Survey name	Identification	Station	TOS	Use
KENNEWICK AIRPORT				
KENNEWICK AIRPORT				ECC
KENNEWICK AIRPORT				RESET
KENNEWICK APT AZ MK				
KENNEWICK APT	RUNWAY	00	OFFSET	HUB
KENNEWICK APT	RUNWAY	36	CL	
KENNEWICK APT	RNWY	02	CL	
KENNEWICK APT	RNWY	20	CL	

FORMAT: ALIGNMENT OBJECT DESIGNATE POLITICAL SPECIAL

1. ALIGNMENT Survey

   The term BOUNDARY is used when two or more participants are in common or adjacent to an alignment.

2. OBJECT Identification

   Enter the type of alignment object, such as name, station, miles, mileposts, monuments, reference points, etc.

3. DESIGNATE Reference

   The designate reference is used to identify the unique number, letters, or symbols that describe the control point.

4. POLITICAL Participants

   A. All participants in common or adjacent to the alignment boundary are listed in alphabetical order.
   B. The political participants to be selected and entered first will be by the following order: international, federal, reservations, state, county, municipal, and private.
   C. The selection order will provide the correct entries for the country/state and county fields used within the NGS data base.

5. SPECIAL Use

   Terms such as A PT, ECC, HUB, PTA, RESET, and TP A are used to explain a local use or disturbance to the original mark.

Examples

Political boundaries

ALIGNMENT	OBJECT	DESIGNATE	POLITICAL	SPECIAL
Survey	Identification	Reference	Participants	Use
BOUNDARY	MONUMENT	84 A	MX US	RESET
BOUNDARY	MILEPOST	360	ND SD	
BOUNDARY	TRAVERSE STATION	110 A	CD US	ECC
BOUNDARY	ARC STONE	14	DE PA	RESET
BOUNDARY	CORNER STONE	2	MD PA	
BOUNDARY	TANGENT STONE	1	DE MD	
BOUNDARY	INTERSECT STONE	OFFSET	DE PA	
BOUNDARY	POINT	24	CD US	
BOUNDARY	REFERENCE POINT	22	AZ CA	

FORMAT: ALIGNMENT OBJECT LOCATION SPECIAL

1. ALIGNMENT Survey Name

   A. Use the term Ixxx for all Interstate highways.
   B. Use the term HIGHWAY for all Federal highways.
   C. Use the term ROUTE for all State highways.
   D. Use the term ROAD for all county roads.
   E. Use the municipality name for all local streets, avenues, boulevards, pikes, roads, etc.

2. OBJECT Identification

   A. Enter the type of alignment object, such as the name and station, miles, mileposts, monuments, reference points, etc.
   B. Or enter the proper name of the alignment, such as the name of the city street.

3. LOCATION Station and Tangent Offset

   A. The location uses two parts, the first part is called the stationing. This part should be, for most cases, a numeric value.
   B. The second part of the location, the tangent offset (TOS), is the location of the point in question with respect to the center of the alignment, that is, the distance (in meters/feet) either left or right.

4. SPECIAL Use

   Terms such as A PT, ECC, HUB, PTA, RESET, and TP A are used to explain a local use or disturbance to the original mark.

Examples
Highways and roads

ALIGNMENT	OBJECT	LOCATION		SPECIAL
Survey name	Identification	Station	TOS	Use
I495	MILEPOST	99.387		ECC
HIGHWAY 50	STATION	1234+00	CL	
ROUTE 355	STATION MARK	233+16	50LT	
ROUTE 193	REFERENCE POINT	21+00	POC	
ROAD 2786	MILEPOST	37.3		RESET
ROCKVILLE	MAPLE AVE STA	1+32	39RT	
ROCKVILLE	MAPLE AVE STA	2+50	POT	
PASCO	MAIN STREET	PI 9		

FORMAT: ALIGNMENT OBJECT LOCATION SPECIAL

1. ALIGNMENT Survey

   A. The terms RAILROAD or RAILWAY for alignments which follow these right-of-ways.
   B. Use the characters CANAL or REACH for those man made waterways.
   C. Use the characters RIVER for all natural waterways.

2. OBJECT Identification

   Enter the type of alignment object, such as name, station, miles, mileposts, monuments, reference points, etc.

3. LOCATION Station and Tangent Offset

   A. The location uses two parts, the first part is called the stationing. This part should be, for most cases, a numeric value.

   B. The second part of the location, the tangent offset (TOS), is the location of the point in question with respect to the center of the alignment, that is, the distance (in meters/feet) either left or right.

4. SPECIAL Use

   Terms such as A PT, ECC, HUB, PTA, RESET, and TP A are used to explain a local use or disturbance to the original mark.

Examples

Railroads, canals and rivers

ALIGNMENT	OBJECT	LOCATION		SPECIAL
Survey	Identification	Station	TOS	Use
RAILROAD	MILEPOST	347.8	CL	RESET
RAILWAY	MILEPOST	216.455	OFFSET	
REACH	1	22+00	400LT	ECC
REACH	1	PI 2		
REACH	3	295+00	400LT	
RIVER	SNAKE MILEPOST	37.3		

FORMAT: LOCATION OWNERSHIP OBJECT SPECIAL

1. LOCATION

   A. The general area in which the landmark is located should be used, such as the nearest city, town, or local geographic area.
   B. However, some landmarks by the nature of their name alone will be enough to give a general location, e.g. STATUE OF LIBERTY (New York), SEARS TOWER (Chicago), and SEATTLE SPACE NEEDLE (Seattle).

2. OWNERSHIP

   A. The ownership should be the proper name of the existing owner at the time the landmark was positioned. Later recovery information will reflect the changes of ownership.
   B. If the ownership is a political group, such as a state or county, do not include the name of the state or county.

3. OBJECT Identification
   For a landmark, enter a general name in order to identify it.

4. SPECIAL Target
   The special target is used to uniquely identify the exact object sighted as the landmark.

Examples
Landmarks

LOCATION	OWNERSHIP	OBJECT	
		Identification	SPECIAL Target
ASHLAND	MUNICIPAL	AIRPORT	BEACON
BETHESDA	GREEK ORTHODOX	CHURCH	CROSS
CARSON CITY	STATE POLICE	RADIO STATION	MAST
FRANKLIN	COUNTY	HOSPITAL	FLAGPOLE
KEY WEST	FORT MONROE	BATTERY	RED LIGHT
LAS VEGAS		TV STATION KLAS	MAST
LOVELOCK		RADIO STATION KOB 893	MAST
NEW YORK	PORT AUTHORITY	BUILDING	FLAGPOLE
PASCO	COUNTY	COURTHOUSE	DOME
POTOMAC	ST MARKS CATHOLIC	CHURCH	SPIRE
ROCKVILLE	HUGHES AIRCRAFT	BUILDING	APEX
ROCKVILLE	MUNICIPAL	GAS TANK	FINIAL
ROCKVILLE	MUNICIPAL	WATER TANK	BALL
ROCKVILLE	MUNICIPAL	STANDPIPE	FINIAL
SALEM	1ST METHODIST	CHURCH	WEST SPIRE
SALEM	STATE	HOSPITAL CLOCK	APEX
WINNEMUCCA		RADIO STATION KWNA	MAST

FORMAT: TOWNSHIP RANGE SECTION LOCATION

Department of Interior, Bureau of Land Management disks are always marked by stamping them so as to be read looking north while standing on the south side. This relationship gives the viewer a pictorial or graphical representation of the physical relationship of the existing subdivision of the land under survey.

The south and east boundaries of each township, for the most part, are the controlling sides, whereas north and west township boundaries will close onto the controlling standard parallel to the north and the guide meridian to the west of it respectively.

1. TOWNSHIP

   A. One Township #
      Indicate the Township containing the identified survey monument.
   B. Two Townships ## (read from south to north)
      (1) List southernmost FIRST (one with lowest latitude)
      (2) List northernmost SECOND (one with higher latitude)

2. RANGE

   A. One Range #
      Indicate the Range containing the identified survey monument.
   B. Two Ranges ## (read from west to east)
      (1) List Range on the left FIRST (western most)
      (2) List Range on the right SECOND (eastern most)

3. SECTION

   A. Arrange and list all sections to be included, in a string of increasing section numbers.
   B. For Township surveys which are incomplete, show the identification (see part 4) as a Cardinal Corner of the "One" lowest section where the subdivision survey has been completed.

4. LOCATION - Identification of a Subdivision Survey Point

A.	Standard Corner	S C
B.	Closing Corner	C C
C.	Meander Corner	M C
D.	Quarter-Section Corner	1/4 COR
E.	Location Monument	L M
F.	Angle Point	A P
G.	Witness Corner	W C
H.	Cardinal Corner	***
I.	Identification as Found	NIR S180 MP31

***Use Lowest Section Number Completed.

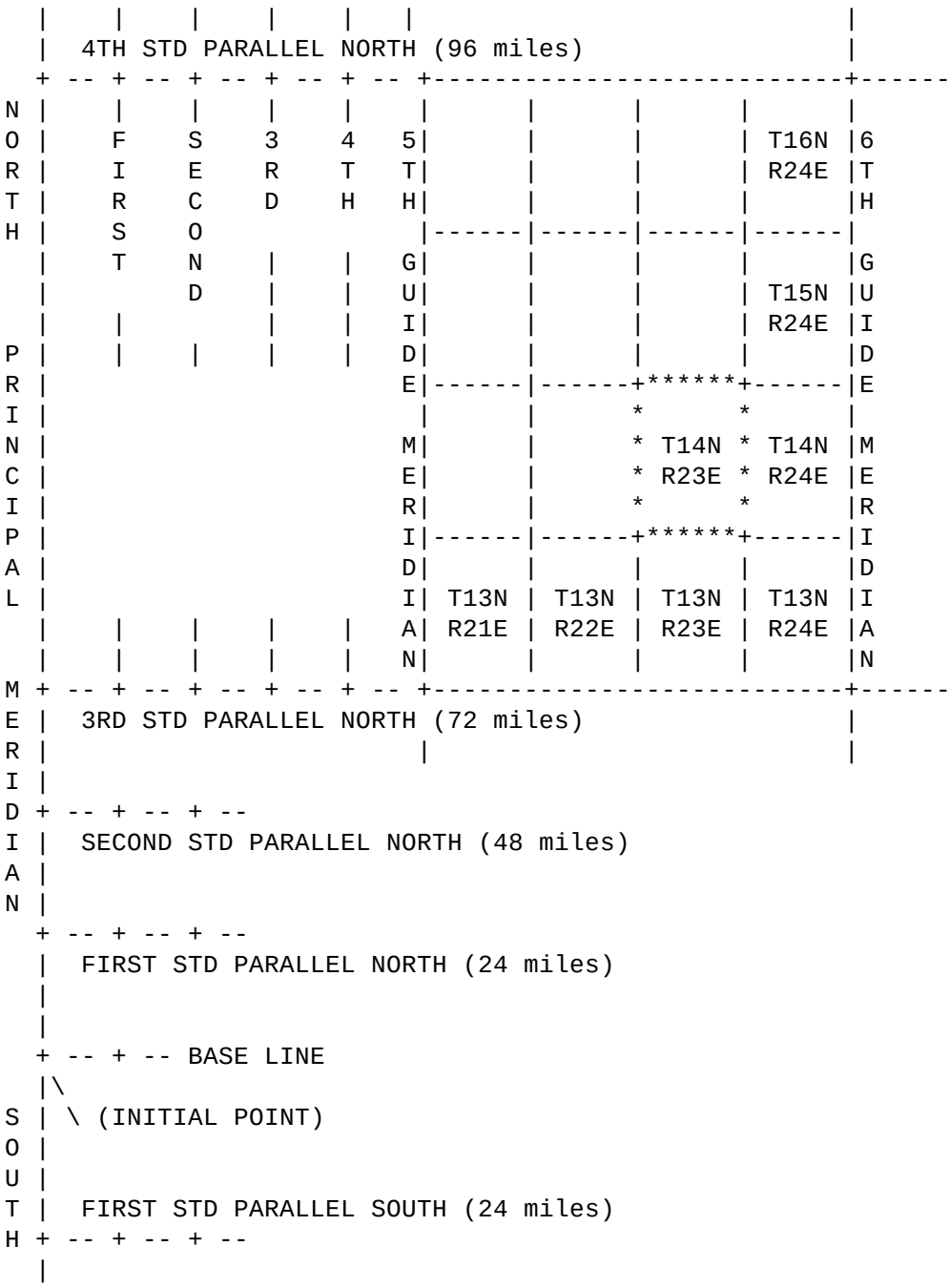

Figure D.1 - Layout of Standard Parallels and Guide Meridians.

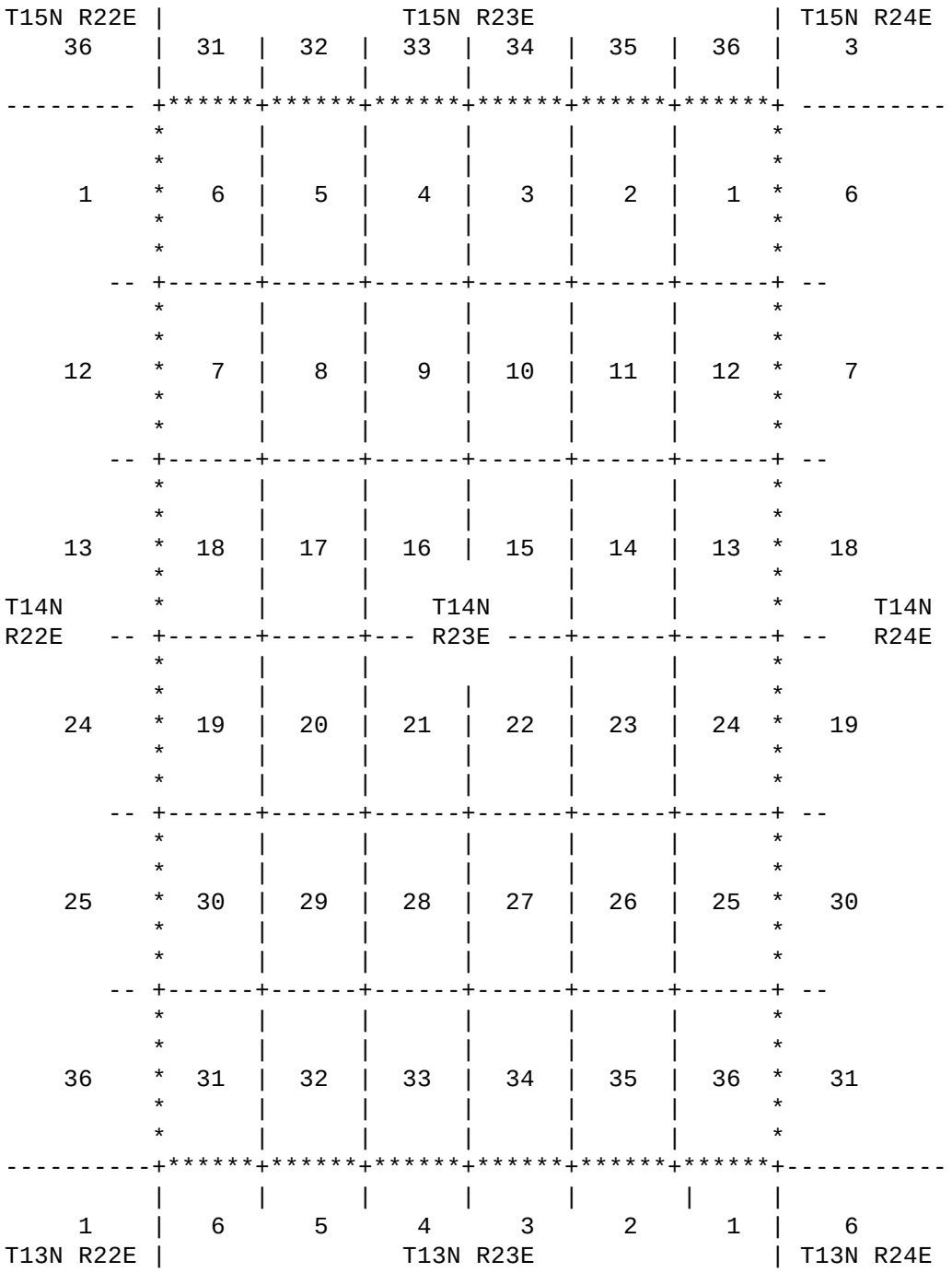

Figure D.2 - T14N R23E SECS (1 - 36) as shown in Figure D.1.

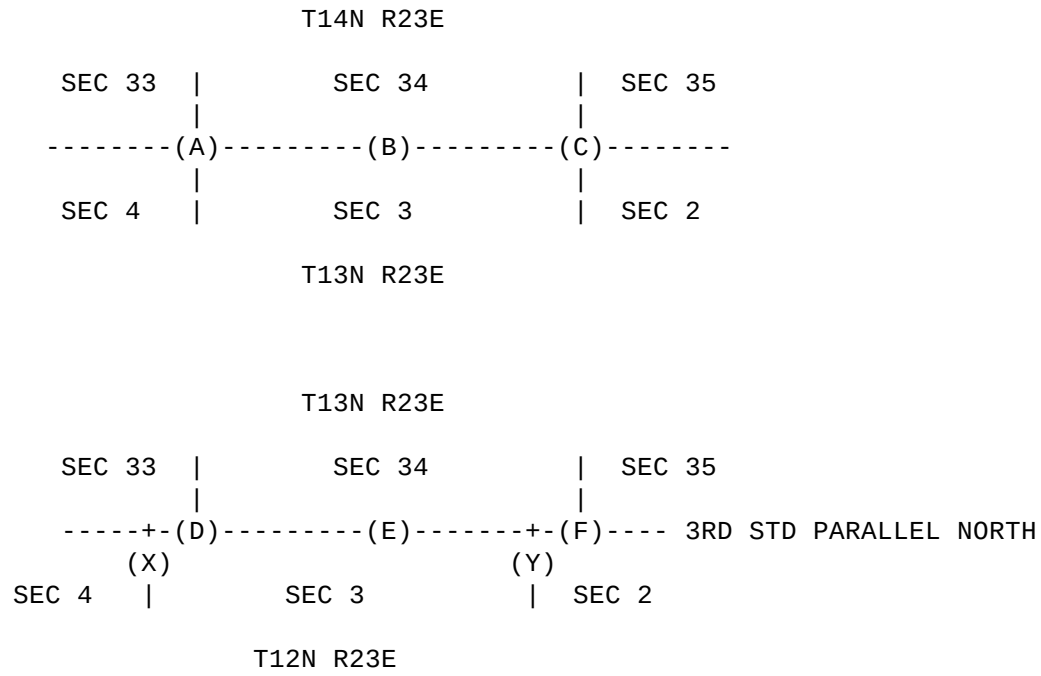

Figure D.3 - Designations for East/West Boundary Corners.

Examples

	TOWNSHIP	RANGE	SECTION	LOCATION
A	T13 14N	R23E	SECS 3 4 33 34	
B	T13 14N	R23E	SECS 3 34	1/4 COR
C	T13 14N	R23E	SECS 2 3 34 35	
D	T13N	R23E	SECS 33 34	SC
or D	T13N	R23E	SEC 33	SE COR
E	T13N	R23E	SEC 34	1/4 COR
F	T13N	R23E	SECS 34 35	SC
or F	T13N	R23E	SEC 34	SE COR
X	T12N	R23E	SECS 3 4	CC
Y	T12N	R23E	SECS 2 3	CC

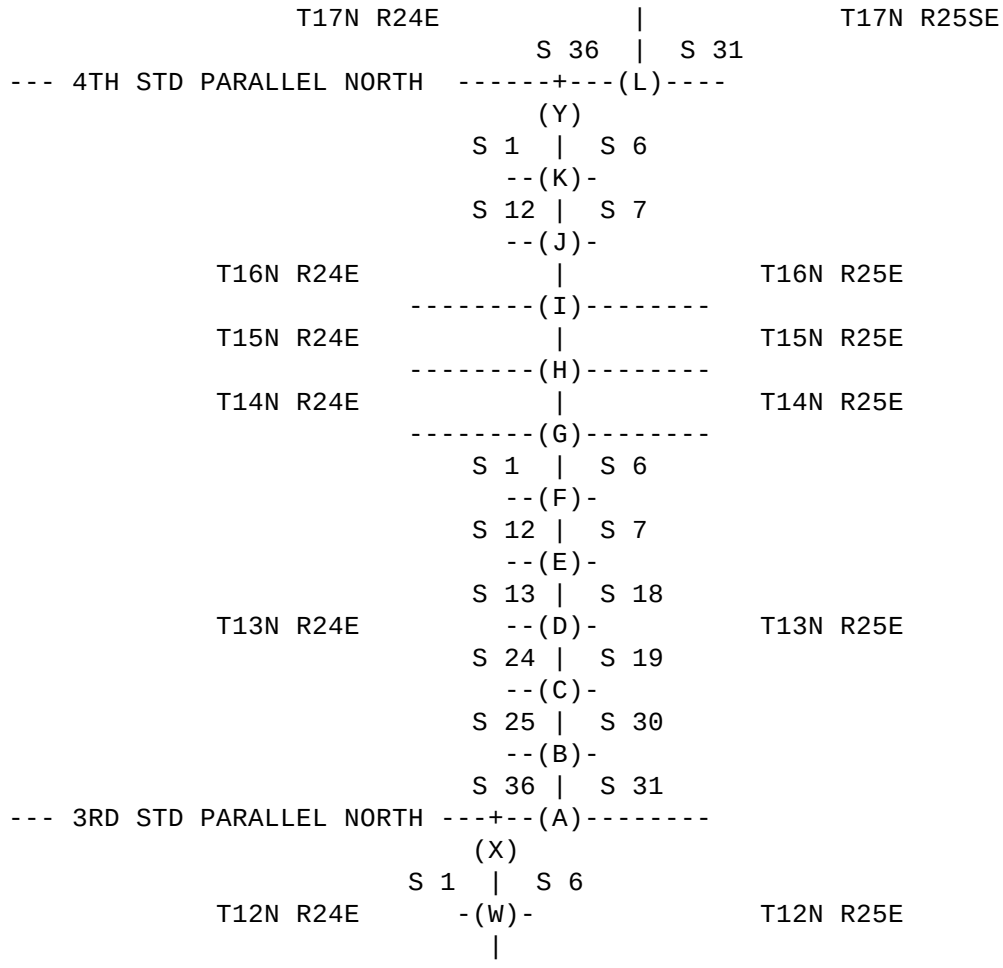

Figure D-4 - Designations for North/South Boundary Corners.

Examples

	TOWNSHIP	RANGE	SECTION	LOCATION
W	T12N	R24 25E	SECS 1 6 7 12	
X	T12N	R24 25E	SECS 1 6	CC
A	T13N	R24 25E	SECS 31 36	SC
B	T13N	R24 25E	SECS 25 30 31 36	
C	T13N	R24 25E	SECS 19 24 25 30	
D	T13N	R24 25E	SECS 13 18 19 24	
E	T13N	R24 25E	SECS 7 12 13 18	
F	T13N	R24 25E	SECS 1 6 7 12	
G	T13 14N	R24 25E	SECS 1 6 31 36	
H	T14 15N	R24 25E	SECS 1 6 31 36	
I	T15 16N	R24 25E	SECS 1 6 31 36	
J	T16N	R24 25E	SECS 7 12 13 18	
K	T16N	R24 25E	SECS 1 6 7 12	
Y	T16N	R24 25E	SECS 1 6	CC
L	T17N	R24 25E	SECS 31 36	SC

ANNEX E

STATION ORDER-AND-TYPE (OT) CODES

This ANNEX contains lists of the various types of horizontal control points with the corresponding two-character Order-and-Type (OT) Codes. These codes are used to classify every horizontal control point according to the general order of accuracy of the main-scheme network of which it is a part and according to the surveying method by which the point is positioned. The use of the OT Codes is explained in Chapter 2, pages 2-35 thru 2-38.

The first character (i.e., the "order code") of the OT Code indicates the order of accuracy of the main-scheme network of which the horizontal control point in question is a part or to which it is connected. It also indicates whether the horizontal control point is permanently marked and recoverable (e.g., a monumented station or a landmark) or not permanently marked and hence nonrecoverable (e.g., an auxiliary point):

ORDER CODES OF RECOVERABLE POINTS:

- A - Order A Interferometric Positioning
- B - Order B Interferometric Positioning
- 0 - Trans-Continental Traverse (TCT)
- 1 - lst-Order Survey Scheme
- 2 - 2nd-Order (Class I and Class II) Survey Scheme
- 3 - 3rd-Order (Class I and Class II) Survey Scheme
- 4 - Lower-Than-3rd-Order Survey Scheme and Supplemental Unmonumented Recoverable Landmarks (see p. E-4)

ORDER CODES OF NONRECOVERABLE POINTS:

- 5 - lst-Order Survey Scheme
- 6 - 2nd-Order (Class I and Class II) Survey Scheme
- 7 - 3rd-Order (Class I and Class II) Survey Scheme
- 8 - Lower-Than-3rd-Order Survey Scheme

The second code (i.e., the "type code") of the OT Code indicates the type of the (primary) surveying method by which the horizontal control point is positioned. It also shows whether the horizontal control point in question is a main-scheme station (i.e., one which is essential to the survey scheme) or a supplemental station (i.e., one which is incidental to the survey scheme):

TYPE CODES OF MAIN-SCHEME STATIONS:

- 1 - Positioned Primarily by Triangulation (or by Intersection)
- 2 - Positioned Primarily by Trilateration
- 3 - Positioned Primarily by Traverse
- A - Positioned Primarily by Interferometric Satellite Relative Positioning

TYPE CODES OF SUPPLEMENTAL STATIONS:

4 - Positioned Primarily by Triangulation
5 - Positioned Primarily by Trilateration
6 - Positioned Primarily by Traverse
7 - Positioned by Intersection (Note: 1 if Main-Scheme Station)
8 - Positioned by Resection
B - Positioned Primarily by Interferometric Satellite Relative Positioning

ORDER-AND-TYPE (OT) CODES OF RECOVERABLE HORIZONTAL CONTROL POINTS - monumented (or otherwise permanently marked) stations, published as indicated.

SURVEY PROCEDURES	STATION TYPE	OT	PUBLISHED
**********	**********	**	*********
MONUMENTED STATIONS POSITIONED BY GPS			
GPS Procedures	Main-Scheme	AA	AA-Order
GPS Procedures	Main-Scheme	BA	B-Order
GPS Procedures	Supplemental	BB	B-Order
STATIONS OF THE TRANS-CONTINENTAL TRAVERSE (TCT)			
TCT Procedures	Main-Scheme *	03	lst-Order
TCT Procedures	Supplemental **	06	lst-Order
MONUMENTED STATIONS POSITIONED PRIMARILY BY TRIANGULATION			
lst-Order	Main-Scheme	11	lst-Order
lst-Order	Supplemental	14	2nd-Order
2nd-Order (Class I or II)	Main-Scheme	21	2nd-Order
2nd-Order (Class I or II)	Supplemental	24	3rd-Order
3rd-Order (Class I or II)	All Stations	31	3rd-Order
Lower-Than-3rd-Order	All Stations	41	Low-Order
MONUMENTED STATIONS POSITIONED PRIMARILY BY TRILATERATION			
lst-Order	Main-Scheme	12	lst-Order
lst-Order	Supplemental	15	2nd-Order
2nd-Order (Class I or II)	Main-Scheme	22	2nd-Order
2nd-Order (Class I or II)	Supplemental	25	2nd-Order
3rd-Order (Class I or II)	All Stations	32	3rd-Order
Lower-Than-3rd-Order	All Stations	42	Low-Order
MONUMENTED STATIONS POSITIONED PRIMARILY BY TRAVERSE			
lst-Order	Main-Scheme	13	lst-Order
lst-Order	Supplemental	16	2nd-Order
2nd-Order (Class I or II)	Main-Scheme	23	2nd-Order
2nd-Order (Class I or II)	Supplemental	26	2nd-Order
3rd-Order (Class I or II)	All Stations	33	3rd-Order
Lower-Than-3rd-Order	All Stations	43	Low-Order

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* Main-Scheme Station - one which is essential to the survey scheme.
** Supplemental Station - one which is incidental to the survey scheme.

SURVEY PROCEDURES	STATION TYPE	OT	PUBLISHED
**********	**********	**	*********
MONUMENTED STATIONS POSITIONED BY INTERSECTION			
lst-Order	Main-Scheme	11	lst-Order
lst-Order	Supplemental	17	2nd-Order
2nd-Order (Class I or II)	Main-Scheme	21	2nd-Order
2nd-Order (Class I or II)	Supplemental	27	3rd-Order
3rd-Order (Class I or II)	All Stations	37	3rd-Order
Lower-Than-3rd-Order	All Stations	47	Low-Order
MONUMENTED STATIONS POSITIONED BY RESECTION			
lst-Order	All Stations	18	2nd-Order
2nd-Order (Class I or II)	All Stations	28	2nd-Order
3rd-Order (Class I or II)	All Stations	38	3rd-Order
Lower-Than-3rd-Order	All Stations	48	Low-Order

ORDER-AND-TYPE (OT) CODES OF NONRECOVERABLE HORIZONTAL CONTROL POINTS -temporary or auxilliary points, not permanently marked, which must be carried in the files for network integrity purposes. These horizontal control points will not be published.

SURVEY PROCEDURES	STATION TYPE	OT
**********	**********	**
STATIONS OF THE TRANS-CONTINENTAL TRAVERSE (TCT) - must be monumented.		
UNMARKED STATIONS POSITIONED PRIMARILY BY TRIANGULATION		
lst-Order	Main-Scheme*	51
lst-Order	Supplemental**	54
2nd-Order (Class I or II)	Main-Scheme	61
2nd-Order (Class I or II)	Supplemental	64
3rd-Order (Class I or II)	All Stations	71
Lower-Than-3rd-Order	All Stations	81
UNMARKED STATIONS POSITIONED PRIMARILY BY TRILATERATION		
1st-Order	Main-Scheme	52
1st-Order	Supplemental	55
2nd-Order (Class I or II)	Main-Scheme	62
2nd-Order (Class I or II)	Supplemental	65
3rd-Order (Class I or II)	All Stations	72
Lower-Than-3rd-Order	All Stations	82

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* Main-Scheme Station - one which is essential to the survey scheme.

** Supplemental Station - one which is incidental to the survey scheme.

SURVEY PROCEDURES	STATION TYPE	OT
**********	**********	**
UNMARKED STATIONS POSITIONED PRIMARILY BY TRAVERSE		
1st-Order	Main-Scheme	53
1st-Order	Supplemental	56
2nd-Order (Class I or II)	Main-Scheme	63
2nd-Order (Class I or II)	Supplemental	66
3rd-Order (Class I or II)	All Stations	73
Lower-Than-3rd-Order	All Stations	83
UNMARKED STATIONS POSITIONED BY INTERSECTION		
lst-Order	Main-Scheme	51
lst-Order	Supplemental	57
2nd-Order (Class I or II)	Main-Scheme	61
2nd-Order (Class I or II)	Supplemental	67
3rd-Order (Class I or II)	All Stations	77
Lower-Than-3rd-Order	All Stations	87
UNMARKED STATIONS POSITIONED BY RESECTION		
lst-Order	All Stations	58
2nd-Order (Class I or II)	All Stations	68
3rd-Order (Class I or II)	All Stations	78
Lower-Than-3rd-Order	All Stations	88

ORDER-AND-TYPE (OT) CODES OF UNMONUMENTED RECOVERABLE LANDMARKS - normally positioned as supplemental low-accuracy control points, possibly used as main-scheme triangulation stations (e.g., a well-defined church spire used as the unoccupied center of a central-point figure in a triangulation network), published as indicated.

SURVEY PROCEDURES	STATION TYPE	OT	PUBLISHED
**********	**********	**	*********
LANDMARKS USED AS MAIN-SCHEME TRIANGULATION STATIONS			
lst-Order	Main-Scheme	11	lst-Order
2nd-Order (Class I or II)	Main-Scheme	21	2nd-Order
3rd-Order (Class I or II)	Main-Scheme	31	3rd-Order
Lower-Than-3rd-Order	Main-Scheme	41	Low-Order
LANDMARKS POSITIONED AS SUPPLEMENTAL CONTROL POINTS			
Any-Order Traverse	Supplemental	43	Low-Order
Any-Order Intersection	Supplemental	47	Low-Order
Any-Order Resection	Supplemental	48	Low-Order

ANNEX F

NGS SURVEY EQUIPMENT CODES

000-099 - Gravity Instruments and Satellite Systems
100-199 - Theodolites and Transits
200-299 - Leveling Instruments
300-399 - Leveling Rods and Staffs
400-499 - Steel and Invar Tapes
500-599 - Lightwave Distance-Measuring Equipment
600-699 - Infrared Distance-Measuring Equipment
700-799 - Microwave Distance-Measuring Equipment
800-899 - Total Station-Measuring Equipment
900-999 - Other Miscellaneous Surveying Equipment

The purpose of the National Geodetic Survey (NGS) Survey Equipment Code is to provide a three-digit identifier for each item of survey equipment commonly used in connection with horizontal and vertical control surveys in the United States. The code has been devised in such a manner that the first digit of the three-digit identifier would indicate a specific category of survey equipment. Accordingly, there are ten broad survey equipment categories, the first of which (000-099) is reserved for gravity instruments and satellite systems, and the last (900-999) is reserved for miscellaneous survey equipment which does not fit into any of the specific categories. The ten survey equipment categories are listed above.

Within each category, specific items and/or classes of survey equipment have been grouped into subcategories and assigned unique three-digit code numbers. The grouping of survey equipment into subcategories is intended to reflect the level of accuracy attained in common usage of the specific items or classes of survey equipment in question and not necessarily their intrinsic or potential accuracy. In each category and subcategory, a code is provided for items of survey equipment which do not appear among the items listed or which are not specifically identified. The respective lists of survey equipment are not all-inclusive, and series of numbers have been skipped in each category and/or subcategory to allow for additions.

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	000-099 - GRAVITY INSTRUMENTS AND SATELLITE SYSTEMS	
	4444444444444444444444444444444444444444444444444	
000	Unspecified	Unknown Instrument or System
	001-009 - Reserved for Absolute Gravity Devices	
	010-029 - Gravimeters	
010	Unspecified	Gravimeter
011	Frost	Frost Gravimeter
012	North American	North American Gravimeter
013	LaCoste-Romberg	Early Models
014	LaCoste-Romberg	G-Meter
015	LaCoste-Romberg	D-Meter
016	Worden	Unspecified
017	Worden	Uncompensated Model
018	Worden	Temperature-Compensated Model
019	Scintrex	CG-2
	030-049 - Doppler Satellite Tracking Systems	
030	Unspecified	Doppler Satellite Tracking System
031	Magnavox	Geoceiver or Geoceiver II
032	JMR	JMR-1
033	ITT	ITT 5500
034	Magnavox	MX-702A
035	APL	Tranet
036	Canadian Marconi	CMA 722A
037	Canadian Marconi	CMA 722B
038	Magnavox	MX-1502
	050-099 - GPS Satellite Tracking Systems	
050	Unspecified	GPS Satellite Tracking System
051	Western Atlas Intl.	Macrometer® V1000
052	Western Atlas Intl.	Macrometer™ II
053	Texas Instruments, Inc.	TI-4100 (GESAR Software)
054	Texas Instruments, Inc.	TI-4100 (TI EPROM Software)
055	Trimble Navigation, Ltd.	4000 series
056	**Leica-Wild-Magnavox**	**WM101,WM102,SR299,399,9500 series,CRS1000**
057	ISTAC, Inc.	Model 2002™
058	EDO Canada, Ltd.	EDO JMR GeoTrak
059	Motorola, Inc.	Eagle series
060	Norstar Instruments, Ltd.	Norstar 1000
061	SERCEL Inc.- USA	TR5S, NR101, NR104
062	Western Atlas Intl.	MINI-MAC™

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	050-099 - GPS Satellite Tracking Systems - Continued	
063	**Ashtech, Inc.**	**XII series, L-,M-,P-,S- & Z- series**
064	Allen Osborne Assoc., Inc.	Rogue series
065	**NovAtel Commun., Ltd.**	**NovAtel GPSCard,Outrider,Millenium**
066	**Topcon America Corp.**	**GP series, TURBO series**
067	Del Norte Technology, Inc.	1008,1012
068	Magellan	NAV5000 PRO
069	**Javad Positioning Systems**	**LEGACY,REGENCY,ODYSSEY**
070	**Sokkia Corporation**	**GSR 2000 & 3000 series**
071	**Specra Precision AB**	**Geotracer 2000 series**
072	**3S Navigation**	**R100 series**
	100-199 - THEODOLITES AND TRANSITS	
	4444444444444444444444444444444444	
100	Unspecified	Theodolite or Transit
	101-119 - Instruments of Geodetic Astronomy	
101	Various	Zenith Telescope
102	Various	Meridian Telescope, Transit, or Circle
103	Various	Bamberg-Type Astronomic Transit
104	Wild	T-4
105	Kern	DKM3-A
106	Gigas-Askania	TPR
107	Zeiss/Jena	Theo-Q02
	120-139 - First-Order (Geodetic) Theodolites	
120	Unspecified	0."1, 0."2, 0."5 Direct-Reading Theodolite
121	Various	Ramsden-Type 30, 24, 12-inch Theodolite
122	Various	USC&GS Parkhurst
123	Wild	T-3
124	Kern	DKM3
125	CTS/Vickers	Geodetic Tavistock
126	Hilger-Watts	Microptic No. 3
	140-159 - Second-Order (Universal) Theodolites	
140	Unspecified	1", 2", 5" Direct-Reading Theodolite
141	Various	USC&GS 7-inch Repeating Theodolite
142	Wild	T-2 or T-2E
143	Kern	DKM2 or DKM2-A
144	CTS/Vickers	V-400 Series
145	Hilger-Watts	Microptic No. 2
146	Dietzgen/Askania	A2 or A2E
147	Zeiss/Oberkochen	Th2
148	Zeiss/Jena	Theo-010 or Theo-OlOA
149	Nikon	NT-3 or NT-5
150	Sokkisha	TM-lA
151	Geotec	TH-01

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	160-169 - Third-Order (Construction) Theodolites	
160	Unspecified	Construction Theodolite or Transit
161	Various	10" Direct-Reading Theodolite or Transit
162	Various	20" Direct-Reading Theodolite or Transit
163	Various	30" Direct-Reading Theodolite or Transit
164	Various	1' Direct-Reading Theodolite or Transit
	170-179 - 30' or Coarser Angulation Devices	
170	Unspecified	30' or Coarser Angulation Device
171	Various	30' or Coarser Theodolite or Transit
172	Various	30' or Coarser Compass Device
173	Various	30' or Coarser Protractor
	180-199 - Gyroscopic Theodolites	
180	Unspecified	Gyro-Theodolite
	200-299 - LEVELING INSTRUMENTS 4444444444444444444444444444	
200	Unspecified	Leveling Instrument
	210-249 - Precise (Geodetic) Levels	
210	Unspecified	Precise Level
	211-230 - Precise Spirit (Bubble-Vial) Levels	
211	Various	USC&GS Fischer
212	USC&GS	Stampfer-Type (1877-1899)
213	Buff & Berger	Van Orden or Mendenhall
214	Various	Kern-Type (US Engineers)
215	Zeiss	Ni-III or Ni-A
216	Zeiss/Jena	Ni-004
217	Wild	N-3
218	Kern	NK3-M
219	Breithaupt	NABON
220	Fennel	Precise Level
221	Hilger-Watts	Precise Level
222	CTS/Vickers	Geodetic Level
223	Sokkisha	PL-5
224	Keuffel & Esser	Precise Level

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	231-249 - Precise Compensator (Self-Aligning) Levels	
231	Zeiss/Oberkochen	Nil
232	Zeiss/Oberkochen	Ni2
233	Zeiss/Jena	Ni-002
234	Zeiss/Jena	Ni-007
235	Wild	NA-2 or NAK-2
236	Salmoiraghi	5190
237	MOM	Ni-A31
238	Sokkisha	B-1
239	Kern	GK2-A
240	Topcon	AT-D2
241	Zeiss	Ni-005A
242	Leica/Wild	NA2000 or NA2002 Digital Level
243	Leica/Wild	NA3000 Digital Level
244	**TOPCON**	**DL101 Digital Level**
245	**TOPCON**	**DL102 Digital Level**
246	ZEISS	DINI10
	250-289 - Engineer's (Universal) Levels	
250	Unspecified	Engineer's Level
	251-270 - Engineer's Spirit (Bubble-Vial) Levels	
251	Various	18-inch Dumpy-Type Level
252	Various	18-inch Wye-Type Level
253	Zeiss	Ni-II or Ni-B
254	Zeiss/Jena	Ni-030
255	Wild	N-2 or NK-2
256	Kern	NK3
257	Kern	NK2
258	Kern	GK23
259	Breithaupt	NAKRE
260	Fennel	Engineer's Level
261	Hilger-Watts	Engineer's Level
262	CTS/Vickers	Engineer's Level
263	Salmoiraghi	5160 Series
264	Nikon	S2
265	Sokkisha	TTL-5 or TTL-6
266	Geotec	L-11 or L-21
	271-289 - Engineer's Compensator (Self-Aligning) Levels	
271	Zeiss/Oberkochen	Ni22
272	Zeiss/Jena	Ni-025
273	Kern	GKl-A
274	Breithaupt	AUTOM or AUCIR
275	Fennel	AUING
276	Hilger-Watts	AUTOSET
277	Salmoiraghi	5173, 5175, or 5180
278	Ertel	INA
279	Nikon	AE Series
280	Sokkisha	B-2
281	Geotec	AL-2 or AL-23
282	Sokkisha	C-1

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	290-299 - Builder's (Construction) Levels	
290	Unspecified	Builder's Level
291	Various	Builder's Dumpy-Type Spirit Level
292	Various	Builder's Tilting Spirit Level
293	Various	Builder's Compensator Level
	300-399 - LEVELING RODS AND STAFFS 4444444444444444444444444444444444	
300	Unspecified	Leveling Rod or Staff
	310-349 - Precise (Geodetic) Metal-Scale Rods	
310	Unspecified	Precise Metal-Scale Rod
311	USC&GS	USC&GS Pre-Invar Rods
312	USC&GS	Invar (Introduced in 1916)
313	Zeiss/Oberkochen	Invar
314	Zeiss/Jena	Invar
315	Wild	Invar
316	Kern	Invar
317	Breithaupt	Invar
318	Fennel	Invar
319	Hilger-Watts	Invar
320	CTS/Vickers	Nilex
321	Salmoiraghi	Invar
322	Keuffel & Esser	Invar
323	Gurley	Invar
324	Renick	Invar (Checkerboard)
325	USGS	Invar (Metal-Frame)
340	Nedo	Invar
341	Nestler	Invar
	350-389 - Engineer's Wooden Rods and Staffs	
350	Unspecified	Engineer's Wooden Rod or Staff
351	Various	US Engineers 12-foot Rigid Rod
352	Various	US Geological Survey 12-foot Rigid Rod
	390-395 - Builder's Rods and Staffs	
390	**Unspecified**	**Builder's Rod or Staff**
391	**Various**	**Philadelphia Rod**
392	**Various**	**Chicago Rod**
393	**Various**	**California Rod**
394	**Various**	**12-foot Folding Rod**
395	**Leica/Wild**	**3-piece Fiberglass (Bar-Code) Rod**
	396-399 - Precise (Geodetic) Metal-Scale, Bar-Code Rods	
396	**Leica/Wild**	**Invar (Bar-Code) Rod**
397	**Zeiss**	**Invar (Bar-Code) Rod**
398	**Topcon**	**Invar (Bar-Code) Rod**

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	400-499 - STEEL AND INVAR TAPES	
	4444444444444444444444444444	
400	Unspecified	Steel or Invar Tape
	420-439 - Calibrated Invar Tapes	
420	Unspecified	Calibrated Invar Tape
421	Various	25-meter Calibrated Invar Tape
422	Various	50-meter Calibrated Invar Tape
423	Various	100-foot Calibrated Invar Tape
	440-459 - Calibrated Steel Tapes	
440	Unspecified	Calibrated Steel Tape
441	Various	30-meter Calibrated Steel Tape
442	Various	100-foot Calibrated Steel Tape
443	Various	300-foot Calibrated Steel Tape
	460-479 - Uncalibrated Steel Tapes	
460	Unspecified	Uncalibrated Steel Tape or Ruler
461	Various	30-meter Uncalibrated Steel Tape
462	Various	100-foot Uncalibrated Steel Tape
463	Various	300-foot Uncalibrated Steel Tape
	500-599 - LIGHTWAVE DISTANCE-MEASURING EQUIPMENT	
	44444444444444444444444444444444444444444444444	
500	Unspecified	Lightwave Electro-Optical DME
501	AGA	Geodimeter Model 1
502	AGA	Geodimeter Model 2 or 2A
503	AGA	Geodimeter Model 3
504	AGA	Geodimeter Model 4A, 4B, or 4D
505	AGA	Geodimeter Model 4L or 4L 10A
506	AGA	Geodimeter Model 6
507	AGA	Geodimeter Model 6A
508	AGA	Geodimeter Model 6B
509	AGA	Geodimeter Model 6BL
510	AGA	Geodimeter Model 7T
511	AGA	Geodimeter Model 700 or 710
512	AGA	Geodimeter Model 76 or 78
513	AGA	Geodimeter Model 8
531	Keuffel & Esser	LSE Ranger I, II, or III
532	Keuffel & Esser	LSE Ranger IV
533	Keuffel & Esser	LSE Ranger V
534	Keuffel & Esser	LSE Rangemaster
535	Keuffel & Esser	Rangemaster II
536	Keuffel & Esser	Uniranger

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	500-599 - LIGHTWAVE DISTANCE-MEASURING EQUIPMENT - CONTINUED	
	4444444444444444444444444444444444444444444444444444444444	
541	Spectra-Physics	Geodolite 3G
542	Spectra-Physics	Transitlite LT-3
551	Kern	ME-3000 Mekometer
561	Cubic Percision	Rangemaster III
562	Cubic Percision	Ranger V-A
571	Leitz	Red 2L
	600-699 - INFRARED DISTANCE-MEASURING EQUIPMENT	
	4444444444444444444444444444444444444444444444444	
600	Unspecified	Infrared Electro-Optical DME
601	AGA	Geodimeter Model 12 or 12A
602	AGA	Geodimeter Model 78,110,114,116
603	AGA	Geodimeter Model 210 or 220
604	AGA	Geodimeter Model 120 or 216
605	AGA	Geodimeter Model 6000
606	AGA	Geodimeter Model 14 or 14A
607	AGA	Geodimeter Model 112 or 122
611	Plessey	Tellurometer CD-6
612	Plessey	Tellurometer MA-100
613	Plessey	Tellurometer MA-200
616	Lietz	Red Mini 2
617	Lietz	Red 2A
621	Wild	Distomat DI-3 Series
622	Wild	Distomat DI-10 Series
623	Wild	Distomat DI-4L
624	Wild	Distomat DI-5 or DI-5S
625	Wild	DI 1000 or 1000L
626	Wild	DI 2000
627	Wild	DI 3000 (time-pulse)
628	Leica/Wild	DI 2002
629	Leica/Wild	DI 1600
631	Kern	DM-500
632	Kern	DM-1000 or DM-2000
633	Kern	DM 104 or DM 150
634	Kern	DM 503 or DM 550
635	Kern	DM 504
641	Zeiss/Oberkochen	SM 11 or RegElta 14
642	Zeiss/Oberkochen	Eldi Series
643	Zeiss/Oberkochen	SM 4
651	Keuffel & Esser	LSE Microranger or Microranger II
652	Keuffel & Esser	LSE Autoranger
661	Hewlett-Packard	3800A or 3800B
662	Hewlett-Packard	3805 or 3810
663	Hewlett-Packard	3808A
667	Pentax	MD-14 or MD-20
671	Cubic Precision	Cubitape DM-60
672	Cubic Precision	HDM-70

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	600-699 - INFRARED DISTANCE-MEASURING EQUIPMENT - CONTINUED	
	4444444444444444444444444444444444444444444444444444444444	
673	Cubic Precision	DM-80 or DM-81
674	Cubic Precision	AutoRanger II
675	Cubic Precision	Beetle 500 or 500S
676	Cubic Precision	Beetle 1000 or l000S
681	Carrol & Reed	Akkuranger Mark I
685	Topcon	DM-C2
686	Topcon	DM-A2 or DM-A3
687	Topcon	DM-S2 or DM-S3
688	Topcon	GTS-2R
693	Nikon	ND 20 or ND 21 or ND 26
694	Nikon	ND 30 or ND 31
	700-799 - MICROWAVE DISTANCE-MEASURING EQUIPMENT	
	4444444444444444444444444444444444444444444444444	
700	Unspecified	Microwave Electro-Magnetic DME
701	Plessey	Tellurometer MRA-1
702	Plessey	Tellurometer MRA-2
703	Plessey	Tellurometer MRA-3
704	Plessey	Tellurometer MRA-4
705	Plessey	Tellurometer MRA-5
709	Plessey	Tellurometer CA-1000
731	Wild	Distomat DI-50
732	Wild	Distomat DI-60
741	Cubic	Electrotape DM-20
751	Fairchild	Microchain
	800-899 - TOTAL STATION-MEASURING EQUIPMENT	
	4444444444444444444444444444444444444444444444444	
800	Unspecified	Total Station
	801-860 - Self Contained Instruments	
801	Leitz	SDM3F or SDM3FR
802	Leitz	SET 2
803	Leitz	SET 3
804	Leitz	SET 4
810	Nikon	NTD-4
811	Nikon	NTD-2S
812	Nikon	DTM1
813	Nikon	DTM5
816	Geotronics AB	Geodimeter 142
817	AGA	Geodimeter 140
821	Pentax	PX20D
822	Pentax	PX10D
823	Pentax	PX06D
824	Pentax	PTS-10

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
****	**********	**********
	801-860 - Self Contained Instruments - Continued	
825	Pentax	PTS-1110
826	Pentax	PTS-1105
830	Topcon	GTS or GTS-2R
831	Topcon	GTS-3B or GTS-3C
832	Topcon	ET-1 or ET-2
833	Topcon	GTS-4A or GTS-4B
840	Wild	TC1600
841	Wild	TC2000
842	Leica/Wild	TC2002
850	Zeiss	ELTA 3
851	Zeiss	ELTA 4
856	Hewlett-Packard	3820A
	861-899 - Modular Instruments	
861	Kern	E1/DM504
862	Kern	E2/DM504
871	Leitz	DT2/Red Mini 2
872	Leitz	DT2/Red 2A or Red 2L
881	Wild	T1000
882	Wild	T1600
883	Wild	T2000 or T2000S
884	Wild	T2002
885	Leica/Wild	T3000
	900-999 - OTHER MISCELLANEOUS SURVEYING EQUIPMENT	
	4444444444444444444444444444444444444444444444	
900	Unspecified	Miscellaneous Surveying Equipment

ANNEX G

ELLIPSOID HEIGHT ORDER-AND-CLASS (OC) CODES

This annex contains ellipsoid height Order and Class (OC) codes. These two-digit codes are used to classify each ellipsoid height value observed and adjusted at horizontal control points.

The first character of the OC code indicates the order and the second character the class, in accordance with the following draft standards for classifying ellipsoid height determinations:

OC Code	Classification	b = Maximum Height Difference Accuracy
11	First Order, Class I	0.5
12	First Order, Class II	0.7
21	Second Order, Class I	1.0
22	Second Order, Class II	1.3
31	Third Order, Class I	2.0
32	Third Order, Class II	3.0
41	Fourth Order, Class I	6.0
42	Fourth Order, Class II	15.0
51	Fifth Order, Class I	30.0
52	Fifth Order, Class II	60.0

The ellipsoid height difference accuracy **(b)** is computed from a minimally constrained, correctly weighted, least squares adjustment by the formula:

$$b = s / \sqrt{d}$$

where: **d** = horizontal distance in kilometers between control points.
s = propagated standard deviation of ellipsoid height difference in millimeters between control points obtained from the least squares adjustment.

The following table lists the standard errors of ellipsoid height differences at various distances:

Standard Error (mm)

OC Code

Distance (km)	11	12	21	22	31	32	41	42	51	52
1	.5	.7	1.0	1.3	2	3	6	15	30	60
5	1.1	1.6	2.2	2.9	4.5	6.7	13	34	67	134
10	1.6	2.2	3.2	4.1	6.3	9.5	19	47	95	190
25	2.5	3.5	5.0	6.5	10	15	30	75	150	300
50	3.5	4.9	7.1	9.2	14	21	42	106	212	424
75	4.3	6.1	8.7	11	17	26	52	130	260	520
100	5.0	7.0	10	13	20	30	60	150	300	600

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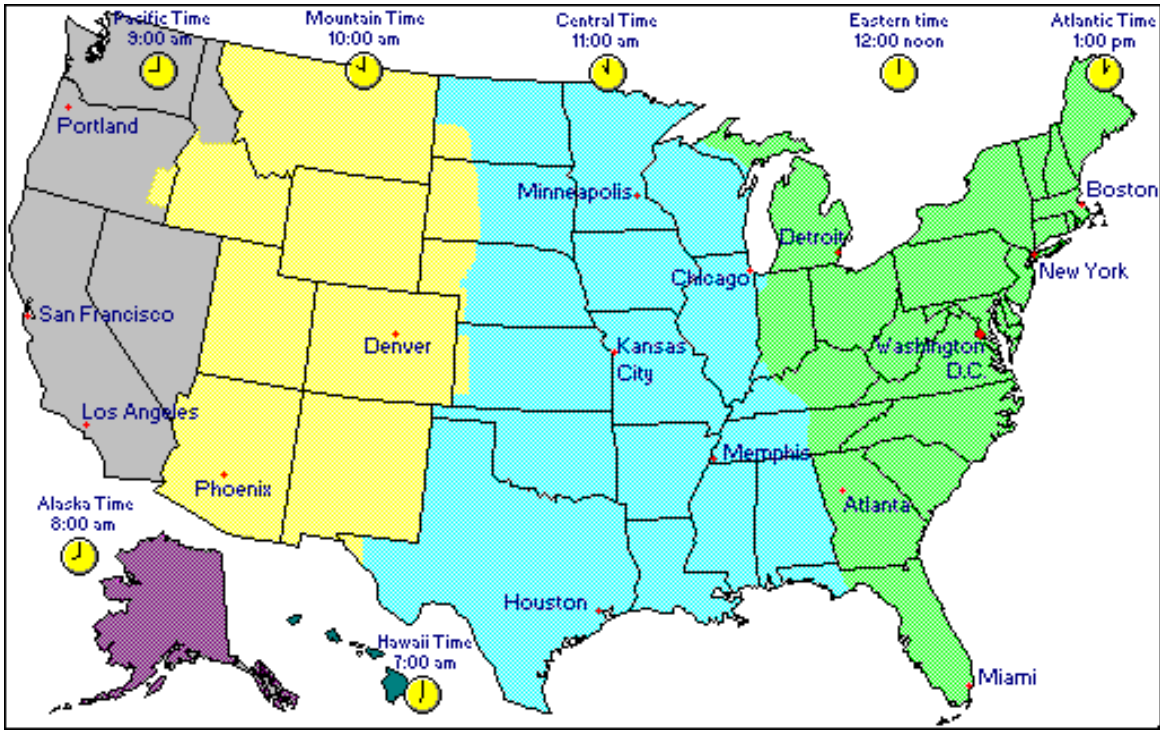
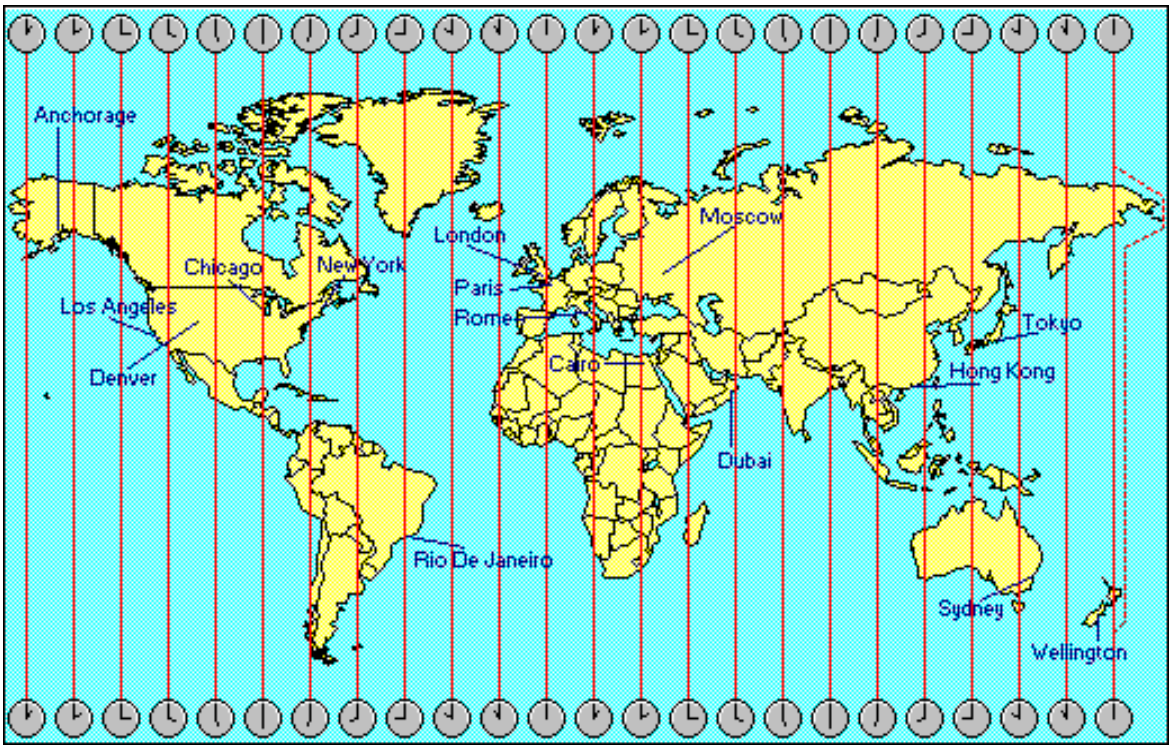
Annex - H

Standard Time Zones





ANNEX I

SUMMARY OF CODES USED IN GEODETIC SURVEY POINT DESCRIPTIONS

This annex contains lists of codes that are used in the preparation of station descriptions and recovery notes pertaining to geodetic control points. The use of these codes is explained in Chapter 3, entitled GEODETIC SURVEY POINT DESCRIPTIVE (GEOD DESC) DATA.

DR CODE - used to identify the descriptive data by type.

ENTRY	DEFINITION
D	An original description of a newly set mark.
R	Everything else (includes recovered, not recovered, destroyed, and the first report to NGS of a pre-existing mark not in the NGS data base).

RECOVERY TYPE CODE (optional) - used to classify recovery descriptions relative to existing information residing in the agency data base.

ENTRY	DEFINITION
F	A full recovery description of a survey point which you think is not included in the NGS Data Base.
M	A recovery description which does not contain a complete textual description of the mark, but **may** contain updates or modifications to the most current description. This is used when a mark is **destroyed or not recovered**, or when the text of the previous description of this mark in the NGS data base requires no update (i.e., the text is in accord with current practice, and the situation at the mark has not changed).
T	A complete re-description of a mark which is included in the NGS data base.

SPECIAL APPLICATIONS CODE - used to represent certain specialized information about the control point.

ENTRY	DEFINITION
F	Fault monitoring site
N	Site not suitable for receiving satellite signals
O	Other (see descriptive text)
P	Site determined suitable for receiving satellite signals in connection with geodetic surveys
T	Tidal station

SETTING CODE - used to complement all MARKER TYPE CODES **except** Landmark stations.

SHALLOW SETTINGS (LESS THAN 10 FT DEEP)	DEFAULT STABILITY CODE
00 - setting not listed - see description	D
01 - unspecified shallow	D
02 - driven into the ground	D
03 - imbedded in the ground	D
04 - surrounded by a mass of concrete	D
05 - set into the top of an irregular mass of concrete	D
07 - set into the top of a round concrete monument	C
08 - set into the top of a square concrete monument	C
set into the top of a prefabricated concrete post ...	
09 - ... imbedded in the ground	D
10 - ... surrounded by a mass of concrete	D
11 - ... imbedded in a mass of concrete	C
set into a prefabricated concrete block ...	
12 - ... imbedded in the ground	D
13 - ... surrounded by a mass of concrete	D
14 - ... imbedded in a mass of concrete	C
15 - a metal rod driven into the ground	D
16 - a metal rod with base plate buried/screwed into the ground	C
set into the top of a metal pipe ...	
17 - ... driven into the ground	D
18 - ... imbedded in the ground	D
19 - ... surrounded by a mass of concrete	D
20 - ... imbedded in a mass of concrete	C
set in concrete at the center of a clay tile pipe ...	
21 - ... fastened to a wooden pile driven into marsh	D
22 - ... imbedded in the ground	D
23 - ... surrounded by a mass of concrete	D
24 - ... imbedded in a mass of concrete	C

SETTINGS IN STRUCTURES	
30 - light structures (other than listed below)	D
31 - pavements (street, sidewalk, curb, apron, etc.)	D
32 - retaining walls, etc.= concrete ledge	C
33 - piles and poles (e.g. spike in utility pole)	D
34 - footings/foundation walls of small/medium structures	C
35 - mat foundations, etc. = concrete slab	C
36 - massive structures (other than listed below)	B
37 - massive retaining walls	B
38 - abutments and piers of large bridges	B
39 - tunnels	B
40 - massive structures with deep foundations	A
41 - large structures with foundations on bedrock	A

UNSLEEVED DEEP SETTINGS (10 FT. +)	
45 - unspecified depth	C
46 - copper-clad steel rod	B
47 - galvanized steel pipe	B
48 - galvanized steel rod	B
49 - stainless steel rod	B
50 - aluminum alloy rod	B

SLEEVED DEEP SETTINGS (10 FT. +)	DEFAULT STABILITY CODE
55 - unspecified pipe/rod in sleeve	B
56 - copper-clad steel rod in sleeve	B
57 - galvanized steel pipe in sleeve	**B**
58 - galvanized steel rod in sleeve	**B**
59 - stainless steel rod in sleeve	**B**
60 - aluminum alloy rod in sleeve	**B**
SETTINGS IN ROCKS OR BOULDERS	
65 - unspecified rock	B
66 - in rock outcrop	A
67 - **set into a drill hole in rock outcrop**	A
68 - ... and marked by a chiseled cross	A
69 - ... and marked by a chiseled triangle	A
70 - ... and marked by a chiseled circle	A
71 - ... and marked by a chiseled square	A
73 - in a rock ledge	A
74 - **set into a drill hole in a rock ledge**	A
75 - ... at the intersection of two chiseled lines	A
76 - ... and marked by a chiseled triangle	A
77 - ... and marked by a chiseled circle	A
78 - ... and marked by a chiseled square	A
80 - in a boulder	C
81 - **set into a drill hole in a boulder**	C
82 - ... and marked by a chiseled cross	C
83 - ... and marked by a chiseled triangle	C
84 - ... and marked by a chiseled circle	C
85 - ... and marked by a chiseled square	C
87 - in a partially exposed boulder	C
88 - **set into a drill hole in a partially exposed boulder**	C
89 - ... and marked by a chiseled cross	C
90 - ... and marked by a chiseled triangle	C
91 - ... and marked by a chiseled circle	C
92 - ... and marked by a chiseled square	C
93 - in bedrock	A
94 - set in a drill hole in bedrock	A
set into a mass of concrete ...	
95 - ... in a depression in rock outcrop	A
96 - ... in a depression in a rock ledge	A
97 - ... in a depression in a boulder	C
98 - ... in a depression in a partially exposed boulder	C
99 - ... in a depression in the bedrock	A

MARKER TYPE CODES - **(Not for Landmark stations)**

A - aluminum marker **(other than a disk)**

B - bolt

C - cap-and-bolt pair

DA - astro marker (usually a disk)

DB - bench mark disk

DD - survey disk

DE - traverse station disk

DG - gravity station disk

DH - horizontal control disk

DJ - tidal station disk

DK - gravity reference mark disk

DM - magnetic station disk

DO - unspecified disk type (see text)

DP - base line pier disk

DQ - calibration base line disk

DR - reference mark disk

DS - triangulation station disk

DT - topographic station disk

DU - boundary marker disk

DV - vertical control disk

DW - NOS hydrographic survey disk

DZ - azimuth mark disk

E - earthenware pot

F - flange-encased rod

G - glass bottle

H - drill hole

I - metal rod

J - earthenware jug

K - clay tile pipe

L - gravity plug

M - ammo shell casing

N - nail

O - chiseled circle

P - pipe cap

Q - chiseled square

R - rivet

S - spike

T - chiseled triangle

U - concrete post

V - stone monument

W - unmonumented

X - chiseled cross

Y - drill hole in brick

Z - see description

MARKER TYPE CODES (Landmark stations)

Landmarks Not Listed:

00 - see description

Natural Objects:

01 - lone tree
02 - conspicuous rock
03 - mountain peak
04 - rock pinnacle
05 - rock awash

Waterfront Landmarks and Visual Aids to Navigation:

11 - piling
12 - dolphin
13 - lighthouse
14 - navigation light
15 - range marker
16 - daybeacon
17 - flag tower
18 - signal mast

Aeronautical and Electronic Aids to Navigation:

21 - airport beacon
22 - airway beacon
23 - VOR antenna
24 - RBN antenna
25 - radar antenna
26 - spherical radome
27 - radio range mast
28 - LORAN mast

Broadcast and Communications Facilities:

41 - antenna mast
42 - radio/TV mast
43 - radio/TV tower
44 - microwave mast
45 - microwave tower

Tanks and Towers:

51 - tank
52 - standpipe tank
53 - elevated tank
54 - water tower
55 - tower
56 - skeleton tower
57 - lookout tower
58 - control tower

Miscellaneous Landmarks:

61 - pole
62 - flagpole
63 - stack
64 - silo
65 - grain elevator
66 - windmill
67 - oil derrick
68 - commercial sign
69 - regulatory sign
70 - monument
71 - boundary monument
72 - cairn
73 - lookout house
74 - large cross
75 - belfry

Features of a Building:

81 - gable
82 - finial
83 - flagstaff
84 - lightning rod
85 - chimney
86 - cupola
87 - dome
88 - observatory dome
89 - spire
90 - church spire
91 - church cross
92 - antenna
93 - microwave antenna
94 - rooftop ventilator
95 - rooftop blockhouse

MAGNETIC CODE - used to indicate the magnetic property of the mark or monument.

A - steel rod adjacent to monument
B - bar magnet imbedded in monument
H - bar magnet set in drill hole
I - marker is a steel rod
M - marker equipped with bar magnet
N - no magnetic material
O - other - see description
P - marker is a steel pipe
R - steel rod imbedded in monument
S - steel spike imbedded in monument
T - steel spike adjacent to monument

TRANSPORTATION CODE - used to indicate the mode of transportation used (or to be used) to reach the station or to reach the location where packing begins, if packing to the station site is required.

A - light airplane
B - boat
C - car (or station wagon)
F - float airplane
H - helicopter
O - other (see descriptive text)
P - light truck (pickup, carryall, etc.)
T - truck (larger than 3/4 ton)
W - tracked vehicle (Weasel, Snowcat, etc.)
X - four-wheel drive vehicle

AGENCY CODE - used to indicate the type of survey organization which established or recovered the geodetic control point.

A - National Agencies
B - Inter-State or Inter-Province Agencies
C - State, Province, Commonwealth, and Territorial Agencies
D - County Agencies
E - Municipal Agencies (Cities)
F - Inter-City and Inter-County Agencies
G - Railroads
H - Utility and Natural Resource Companies
I - Surveying, Engineering, and Construction Industry
J - Educational Institutions
K - Professional and Amateur Associations
L - Miscellaneous Commercial or Private Firms
M - Non-Specific Designators

CONDITION CODE - used to indicate the condition of the monument or mark each time the geodetic control point is recovered.

G - Good
N - Not Recovered, Not Found
O - Other (See descriptive text)
P - Poor, Disturbed, Mutilated, Requires Maintenance
X - Destroyed (See Note Below)

STABILITY CODE - may be entered in the *26* coded record to override the software default codes in the descriptions for publication.

CODE	DEFINITION
A	Monuments expected to hold their elevations very well.
B	Monuments which generally hold their elevations fairly well.
C	Monuments which may be affected by surface ground movements.
D	Monuments of questionable or unknown vertical stability.

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ANNEX J

NGS GPS ANTENNA CODES

GPS ANTENNA CODE	MANUFACTURER, MODEL/NAME OF ANTENNA	MODEL#/PART#
AOA D/M+crB	ALLEN OSBORNE ASSOC., DORNE MARGOLIN B	
ASH 700228.A	ASHTECH, L1/L2	700228A
ASH 700228.B	ASHTECH, L1/L2	700228B
ASH 700228.C	ASHTECH, L1/L2, NO LEVEL	700228C
ASH 700228.D	ASHTECH, L1/L2, REV. B 'L-SHAPED NOTCHES'	700228D
ASH 700228.E	ASHTECH, L1/L2, REV. B 'L-SHAPED NOTCHES'	700228E
ASH 700700.A	ASHTECH, MARINE L1/L2	700700 (A)
ASH 700700.B	ASHTECH, MARINE L1/L2	700700 (B)
ASH 700700.C	ASHTECH, MARINE L1/L2	700700 (C)
ASH 700718.A	ASHTECH, GEODETIC III ANTENNA	700718A
ASH 700718.B	ASHTECH, GEODETIC III ANTENNA	700718B
ASH 700829.2	ASHTECH, GEODETIC III ANTENNA, USCG VERSION	700829 2
ASH 700829.3	ASHTECH, GEODETIC III ANTENNA, USCG VERSION	700829 3
ASH 700829.A	ASHTECH, GEODETIC III ANTENNA, USCG VERSION	700829A
ASH 700829.A1	ASHTECH, GEODETIC III ANTENNA, USCG VERSION	700829A1
ASH 700936.A-rd	ASHTECH, CHOKE RING ANTENNA - NO RADOME	700936A
ASH 700936.B-rd	ASHTECH, CHOKE RING ANTENNA - NO RADOME	700936B
ASH 700936.C-rd	ASHTECH, CHOKE RING ANTENNA - NO RADOME	700936C
ASH 700936.D-rd	ASHTECH, CHOKE RING ANTENNA - NO RADOME	700936D
ASH 700936.A	ASHTECH, CHOKE RING ANTENNA	700936A
ASH 700936.B	ASHTECH, CHOKE RING ANTENNA	700936B
ASH 700936.C	ASHTECH, CHOKE RING ANTENNA	700936C
ASH 700936.D	ASHTECH, CHOKE RING ANTENNA	700936D
GEO 2200	GEOTRACER,	2200
JPL D/M+crR	JET PROPULSION LAB., DORNE MARGOLIN R	
JPL D/M+crT	JET PROPULSION LAB., DORNE MARGOLIN T	
LEI SR299.I	LEICA, SR299 RECEIVER WITH INTERNAL ANTENNA	
LEI SR299.X-gp	LEICA, (AT202) EXTERNAL WITHOUT GP	WILD AT202
LEI SR299.X+gp	LEICA, (AT202) EXTERNAL WITH GP	WILD AT202
LEI SR399.I	LEICA, SR399 RECEIVER WITH INTERNAL ANTENNA	
LEI SR399.X-gp	LEICA, (AT302) EXTERNAL WITHOUT GP	WILD AT302
LEI SR399.X+gp	LEICA, (AT302) EXTERNAL WITH GP	WILD AT302
LEI AT303+rd	LEICA, CHOKE RING ANTENNA - WITH RADOME	LEICA AT303
LEI AT303-rd	LEICA, CHOKE RING ANTENNA - NO RADOME	LEICA AT303
MAC 4647942	MACROMETRICS, MACROMETER CROSSED DIPOLES	
TOP 72110	TOPCON,	72110
TRM	MICROPULSE, M-PULSE L1/L2 SURVEY	
TRM 14532.00	TRIMBLE, 4000SST/SSE L1/L2 GEODETIC	14532-00
TRM 14532.10	TRIMBLE, 4000SSE KIN L1/L2 - NO GP	14532-10
TRM 22020.00	TRIMBLE, COMPACT L1/L2	22020-00
TRM 22020.00-gp	TRIMBLE, COMPACT L1/L2 - NO GP	22020-00
TRM 27947.00-gp	TRIMBLE, RUGGED L1/L2 - NO GP	27947-00
TRM 27947.00+gp	TRIMBLE, RUGGED L1/L2 - WITH GP	27947-00
TRM 23903.00	TRIMBLE, PERMANENT L1/L2	23903-00
TRM 29659.00	TRIMBLE, CHOKE RING ANTENNA	29659-00
TRM 33429.00	TRIMBLE, MICRO CENTER	33429-00
SEN 67157514	SENSOR SYSTEMS, L1/L2	
SEN 67157514+cr	SENSOR SYSTEMS, WITH CHOKE RING	
SEN 67157549	SENSOR SYSTEMS, L1	
SEN 67157549+cr	SENSOR SYSTEMS, L1 WITH CHOKE RING	
SEN 67157596	SENSOR SYSTEMS, L1/L2	
SEN 67157596+cr	SENSOR SYSTEMS, L1/L2 WITH CHOKE RING	

ANNEX K

PROJECT REPORT INSTRUCTIONS

Information concerning data preparation and transmittal to NGS is found in Chapter 1, HORIZONTAL CONTROL (HZTL) DATA, in Chapter 5, VERTICAL CONTROL (VERT) DATA, and in Chapter 9, GRAVITY CONTROL (GRAV) DATA. The section titled "Media for Submitting Data" describes procedures for packaging of the data as well as information required in the letter of transmittal pertaining to the floppy disks or magnetic tape. The transmittal letter should inventory the total contents of the shipment. In addition, special instructions for submitting GPS relative positioning data to the NGS are provided in ANNEX L.

The most important supporting document that should be included with the shipment is the project report. The project report is the permanent hardcopy record that summarizes project accomplishments. It describes the general project goals and the equipment and procedures employed to meet specific conditions and requirements. The report provides information useful for verification and adjustment, including detailed explanation of unusual or special features of the project. The recommended content of a project report follows. The project sketch is an attachment to the report. For projects totally or partially supported by NGS, a different report may be required.

Report Outline for a Horizontal Control Project

I. Title page. List the type of report (Horizontal Control), order-class of survey, project title including the state, any appropriate identifying control number, beginning and ending dates of field work, agency name, and the name of the project director (supervisor). The project title should include the locality of the survey (e.g., Brainerd to Crosby, MN).

II. The report should address the following topics:

A. Location. Briefly describe the project area, indicating each state and the counties in which the project is located.

B. Scope

1. Purpose. State the purpose of the survey and the extent to which the requirements were satisfied.

2. Specifications. State the specifications which were followed and the methods used.

3. Monumentation. Describe the monumentation that was established and recovered.

4. Instrumentation. List the instruments and equipment used. For EDM, describe the instrument calibration and how the calibration and refractive index corrections were applied. Include model and serial numbers of all instrumentation.

5. Special equipment. List any special equipment used. Examples include Bilby towers, helicopters, wooden stands, Peck towers, etc.

6. Existing control. List all existing horizontal control contained in the project area, NGS-published or otherwise. For NGS control, list the quadrangle and station numbers. Also, include any bench marks used to control the elevations. For existing horizontal control <u>not connected</u> to the new survey, include an explanation of why connections were not made.

C. Comments (THIS IS THE MOST IMPORTANT SECTION OF THE REPORT!)

1. Reconnaissance. When a reconnaissance plan was submitted and approved by NGS prior to beginning the field measurements, describe any changes from the original reconnaissance and the reasons for the changes.

2. Specifications. Describe any deviations from the specifications used and the reason for such deviations.

3. Computations. Describe which computations were performed, the coordinate system used (e.g., latitude and longitude, state plane, or local rectangular grid), and what type of adjustment, if any, was performed.

4. Problems. Describe any problems encountered such as: moved or "suspect" marks, bad check angles, and poor position, azimuth, and length checks.

5. Recommendations. Describe any recommendations for future field measurements and/or recomputation of published data.

D. Statistics

1. Points. List the number of points positioned grouped by type of mark such as: new main scheme, old main scheme, and/or landmark stations.

2. Observations. List the number of observations and their precision grouped by type of observation such as: horizontal directions, zenith distances, vertical angles, distances, and astronomic azimuths.

3. Closures

   a. Triangle. List the number of triangles, the average triangle closure, and the maximum triangle closure. For the maximum triangle closure, identify the three vertices.

   b. Traverse. For each traverse closure, identify the traverse segment and list the azimuth closure, the position closure, the total length, the number of courses, and the minimum course length.

4. Reoccupations. List any reoccupied stations, the lines reobserved, the reason for the remeasurement.

5. Check measurements. List comparisons between previously observed angles (check angles) and/or distances with current observations. Also, list the average and maximum disagreements.

6. Fixed measurements. List comparisons between computed observations (computed from existing coordinate data) and current observations. Also, list the average and maximum disagreements.

E. Status

1. Records. Describe the current status and future disposition of the station and observation records. If submitted to NGS, they will be archived in a Federal records center.

2. Contact. Provide the name and telephone number of a person to contact regarding questions which may arise during NGS processing of the data.

III. Attachment to the report. Include as an attachment to the project report an original and three copies of a sketch of the project area. The sketch must show station names and lines which were observed for angles and distances. To ensure that reproductions and film reductions of sketches are of optimum quality, sketches should not be drawn on maps. Although linen, mylar or vellum are desirable, it is not required. A 24" x 36" sketch is preferred, but the size should not exceed 36" x 48". An overview of the project geometry is one objective of the sketch, and, therefore, a scaled drawing with tick marks is required. Symbols and notations explained in C&GS Special Publication 247, (1959: pp. 6,191, and 192) are suggested. The names of main scheme stations will be placed adjacent to the station symbol. Supplemental stations may be numbered for reference to a list of names. Submitting agency or organization name should appear in a title block. The sketch may be hand lettered.

Report Outline for a Vertical Control Project

I. Title page. List the type of report (Vertical Control), order and class of survey, project title including the state, any appropriate identifying number (for projects that have been assigned HGZ accession numbers by NGS, the numbers should be listed on the title page), beginning and ending dates of both mark setting and leveling, agency name, and the name of the project director (supervisor). The project title should include the locality of the project.

II. The report should address the following topics:

A. Location. Briefly describe the project area, including state or states in which it is located. Note the number of lines, their general configuration, and their total distance.

B. Scope

1. Purpose. State the purpose of the survey and the extent to which the requirements were satisfied.

2. Specifications. State the specifications which were followed and the methods used.

3. Monumentation. Describe the monumentation that was established and recovered.

4. Instrumentation. Describe the equipment, including a list of instruments, rods (including calibration information), and recording equipment. Include model and serial numbers of all equipment and the dates they were in use. Note the reasons for return of equipment for repairs or adjustment. For rod calibrations, cite which previously submitted calibration data are to be used to process the project. If none were submitted previously, include such calibration data with the leveling data submitted with this report.

C. Comments (THIS IS THE MOST IMPORTANT SECTION OF THE REPORT!)

1. Reconnaissance. If a reconnaissance plan was submitted and approved by NGS prior to beginning the field measurements, describe any changes from the original reconnaissance and the reasons for the changes.

2. Specifications. Describe any deviations from the specifications used and the reason for such deviations.

3. Routes. Briefly describe each line, including line number or other identification, topography and climate, features of the routing such as control point spacing and frequency of connections, unusual points leveled, unusual procedures, river or valley crossings, and ties established.

4. Problems. Describe all problems encountered, such as: moved or "suspect" marks, systematic new-minus-old comparisons, poor ground or atmospheric conditions, etc.

5. Recommendations. Mention specific sections that required additional work as a result of preliminary analysis. Describe areas which may require additional leveling in the future.

D. Statistics

1. Closures. List loop closures for all loops of concurrent surveys. State the accumulated forward-backward difference for each line.

2. Check-measurements. Compute and list new-minus-old tabulations for all releveling of previously leveled lines. Also, list the average and maximum disagreements.

3. Progress. (Needed only if submitting organization is supported by NGS funding and/or equipment). Total progress along lines, double-run progress, single-run progress, total distance leveled, distance leveled as reruns, and number of sections.

4. Reruns. For all sections that were releveled for any reason other than those exceeding the tolerance limit, list the sections and the reasons for releveling.

E. Status

1. Records. Describe the current status and future disposition of the station and observation records. If submitted to NGS, they will be archived in a Federal records center.

2. Contact. Provide the name and telephone number of a person to contact regarding questions which may arise during NGS processing of the data.

III. Attachments to the report. Include as an attachment to the report a simple sketch of the project area showing completed lines, junctions, and loops. A section of the State Index Map of Control Leveling is sufficient with progress marked and lines clearly labeled. Also, attach copies of sketches showing loop closure computations.

Report Outline for a GPS Control Project

(See ANNEX L beginning on page **L-5**)

Assistance and Mailing Information

The point of contact at NGS for questions concerning the Input Formats and Specifications of the National Geodetic Survey Data Base is:

Mr. Sherrill Snellgrove
National Geodetic Survey
NOAA, N/NGS23
1315 East-West Highway, Station **8753**
Silver Spring, Maryland 20910-3282

Telephone: (301) **713-3200, ext. 100**

Classical horizontal and/or classical vertical data sent to NGS via U.S. Postal Service, United Parcel Service or similar commercial carrier should be addressed:

Director, National Geodetic Survey
NOAA, N/NGS12
1315 East-West Highway, Station **9202**
Silver Spring, Maryland 20910-3282

GPS data sent to NGS via U.S. Postal Service, United Parcel Service or similar commercial carrier should be addressed:

Ms. Madeline White
National Geodetic Survey
NOAA, N/NGS42
1315 East-West Highway, Station 8432
Silver Spring, Maryland 20910-3282

REFERENCE

Gossett, F.R., 1950, rev. 1959: Manual of geodetic triangulation. C&GS Special Publication 247, 344 pp. National Geodetic Information Branch, NGS, NOAA, Rockville, MD 20852.

ANNEX L

GUIDELINES FOR SUBMITTING GPS RELATIVE POSITIONING DATA

Global Positioning System (GPS) relative positioning data submitted to the National Geodetic Survey (NGS) of the National Oceanic and Atmospheric Administration for inclusion in the National Geodetic Reference System (NGRS) must meet the following requirements.

1.0 GPS RAW OBSERVATIONS (R-files): The raw GPS observations will be sent to NGS in a format specified by NGS at the time of submission. Each R-file consists of the set (one or more data files) of raw GPS data for each unique (independent) occupation of a station. For example, if there were four receivers observing during each of five sessions a total of 20 raw data sets would be collected.

2.0 GPS VECTOR SOLUTIONS (G-file): The unadjusted vectors will be submitted in the format specified in ANNEX N. Submit one G-file for each GPS survey project. The G-file may be generated from one of the following: (1) a subroutine of the GPS vector processing software; (2) a stand-alone program that reads the printer output file of the vector processing software; or (3) software that prompts the user for keyboard entries such as CR8G (NGS 1988).

The G-file contains such information as:

(1) From/to station identification
(2) Vector coordinate differences (DX, DY, DZ), standard deviations, correlations (or covariance data)
(3) Name of processing software and version
(4) Date of solution
(5) Source of the ephemerides
(6) Coordinate system (datum) for the vectors
(7) Method of reduction (i.e., fixed or adjusted orbit solutions, single session or network reduction mode, and single or dual frequencies).

When processing data from two stations at a time, the technique is called the "single" vector processing method. If one uses this method for data compiled in the G-file, the G-file may include all possible unique combinations (independent and dependent) of the vectors. With this method there will be $n(n-1)/2$ possible vectors for each observing session, where n is the number of receivers simultaneously observing during the session. If only the (n-1) independent vectors are submitted, then every effort must be made to submit the shortest vectors since these are most likely to be the results of fixed integer bias solutions.

If processing all data collected during an independent observing session in a combined multiple vector solution the computation is called the "session" processing method. The session G-file entry would include results for the (n-1) independent vectors, where n is equal to the number of receivers collecting data simultaneously during the unique observing session.

If processing multiple sessions in a combined solution the result is called a "network" solution. The G-file would contain (s-1) independent vectors from each network solution, where s is the total number of unique stations incorporated in the solution.

The vectors generated in the "fixed orbit" solution mode using either the "broadcast" (predicted) or "precise" (post fit) ephemerides will be referenced to the satellite or fiducial station coordinate system. The current broadcast ephemeris coordinate system is known as the World Geodetic System 1984 (WGS 84) (DMA 1987). All analyses submitted to NGS, including minimally constrained or "free" adjustments, will be completed in the WGS 84 system or an internationally recognized coordinate system.

3.0 GPS PROJECT AND STATION OCCUPATION DATA FILE (B-file): Submit one B-file for each project. It may be created by using a program like CR8BB (NGS 1990). The software functions independently of the type of receivers used during the project.

The B-file contains information related to the project (such as name, location, etc.) and information for each station occupation [such as observer's initials, model and serial number of equipment, best estimates for the station coordinates, weather data, antenna height measurements (vertical), station name, operator comments, receiver time-offset measurements (if applicable), etc.].

B-file formats are described in Volume 1, Chapter 2.

4.0 STATION DESCRIPTION FILE (D-file): Create one D-file for each GPS project. This file contains descriptive or recovery information for each station visited during the GPS survey. It would include any points connected to the GPS survey using conventional horizontal surveying and/or differential leveling techniques, and miscellaneous reports for NGRS points visited but not occupied during the GPS survey. Submit the file in agreement with the format described in volume I, Chapter 3 and annexes C, D and I.

New descriptions should be created using program DESC which is part of a set of programs called DDPROC (NGS 1992). Descriptive data for existing NGRS points in a project area should be requested from NGS prior to starting reconnaissance. The data can be downloaded from the NGS data base and converted to a form usable by the DESC program for updating purposes.

5.0 HORIZONTAL CONNECTION SURVEY DATA FILE (T-file): A T-file must be created and submitted with the GPS project if the project includes any surveys observed with conventional (terrestrial) horizontal surveying techniques. For example, if an existing station was not a suitable GPS site and an offset point was used, the data compiled in the T-file would be for the horizontal tie between the two points. The T-file may be created with MTEN (NGS 1991b).

T-file formats are described in volume I, chapters 1 and 2.

6.0 VERTICAL CONNECTION SURVEY DATA FILE (L-file): If the GPS survey project includes observations using conventional differential leveling techniques, an L-file must be created and submitted with the GPS project data. For example, if a bench mark could not be occupied directly with a GPS receiver system and an offset point was set, part of the data entered connecting the two points together would be for the leveling observations between the two points.

If only one NGRS vertical point (bench mark) was leveled to at a GPS station site, the leveling data will be considered part of the GPS survey. If a good two-bench mark tie is made to the NGS Vertical control network, the leveling will be considered as a vertical control survey. Formats for these data are in Volume II.

Create the L-file with NGS software called PCvOBS (NGS 1989). Note that this program is to be used in place of program MTEN.

7.0 ANALYSIS AND ADJUSTMENT DATA:

7.1 Loop misclosures and differences in repeat vector measurements should be computed and evaluated to check for blunders or significant vector errors. They are also used to obtain initial estimates of the consistency of the GPS survey network. They should be done according to the "Office Procedures" in the publication, "Geometric Accuracy Standards and Specifications for GPS Relative Positioning Surveys" (FGCC 1989). Note that these checks are not an indication of accuracy but rather a measure of precision or repeatability.

Particular attention shall be given to detection of possible blunders caused by antenna offset measurements (vertical) and/or centering errors (horizontal). A tabulation of the results of repeat vector comparisons will be included in the project report.

7.2 A minimally constrained (free) least squares, three dimensional (3D) adjustment (one station arbitrarily selected and held equal to known, i.e published, NGRS coordinates) will be completed in accordance with the "Office Procedures" of the "Geometric Accuracy Standards and Specifications for GPS Relative Positioning Surveys" (FGCC 1989).

Submit a computer listing (burst and bound) that shall clearly include at least the following:

(a) Input vector component data. (Depending on adjustment software used, this may include variance-covariance data.)
(b) The "a priori" standard errors used if variance-covariance data were not used.
(c) Station list with name (abbreviated as appropriate), project unique four-character identification code, project unique numeric code used in adjustment, initial coordinates (latitude, longitude, and height above ellipsoid), and the fixed station specified.
(d) Adjusted vectors with residuals (v) and normalized residuals (v').
(e) "A posteriori" variance of unit weight of the adjustment.
(f) Adjusted coordinates for each station including the station held fixed in the "free" adjustment.
(g) Datum for the satellite coordinate system (e.g., WGS 84).
(h) The reference ellipsoid used in the adjustment. (e.g. WGS 84 or GRS 80)
(i) Other appropriate data or statistics.

The estimate of the variance factor ("a posteriori" variance of unit weight) should be less than 2 in the "free" (minimally constrained) adjustment. It may range between 1 and 16 or more depending upon how close the variance estimates for the vector components of the vector solutions are to the true values.

Estimates which are optimistic (i.e., too small) will result in higher variance factor values. Show clearly the name and version of the 3D adjustment software used.

7.3 A constrained 3D adjustment shall be submitted if project specifications require the computation of adjusted coordinates for the new points in relation to the local datum. A constrained adjustment for a project in North or Central America involves adjusting the GPS vector data while constraining stations to the existing network of NGS published horizontal coordinate data in the North American Datum of 1983 (NAD 1983) system and NGS published vertical data in the North American Vertical Datum of 1988 (NAVD 1988) system or their successors.

The unknown orthometric heights will be determined by the most appropriate method for achieving the specified accuracy standard for the project. This will usually involve one of two methods. The first method incorporates "a priori" geoidal undulation data in the 3D adjustment while holding fixed the orthometric heights for stations with known values (determined by differential leveling techniques). The source for the geoidal separation data (e.g., GEOID 93) must be given. This includes the name of software, version, and data used for computing the geoidal separation.

The second method for determining orthometric heights from GPS vector data involves performing 3D adjustments using no geoidal undulation data. In this method, the orthometric heights are held fixed while using zero values for the geoid height above the ellipsoid in the 3D adjustment. This forces the GPS network to fit to the geoidal surface. The success of achieving the specified accuracy standard for the orthometric heights at the points with unknown values will depend upon the flatness of the geoid in the project area and the distribution of the stations with known orthometric heights. This method is discussed in more detail in the article "On the use of GPS vectors in densification adjustments" (Vincenty 1987).

A tabulated listing of stations and fixed and adjusted coordinate values must be provided. The project report must give a description of the method used to estimate the orthometric heights.

8.0 PROJECT SKETCH: A sketch will be drawn in black ink on white paper showing all stations occupied during the GPS survey. **The sketch will have a border drawn around the edge and must include grid ticks for latitude and longitude**. Use the following standard symbols for the stations:

(a) Squares for existing vertical network control
(b) Open triangles for existing horizontal control stations
(c) Open triangles within squares for existing horizontal/vertical stations
(d) Closed triangles for GPS stations
(e) Circles for stations occupied during previous GPS projects

A "D" next to the station symbol will be used to indicate a Doppler station that has point-position coordinates determined using "precise" ephemerides. (Contact NGS for a list of Doppler stations with "precise" ephemerides point position coordinates located in North America.)

Besides the stations occupied, the sketch should show other stations of the existing network located within or near the project area. Specify in the project report whether any attempt was made to recover these stations. The report must state why the recovered stations were not occupied. To show a station that was not recovered use "NR" next to that station's symbol. The sketch shall include a boxed-in legend that gives:

(a) project name
(b) general locality
(c) name of group making observations
(d) project leader
(e) month/year (from-to)
(f) scale of sketch

On a copy of the sketch, form closed loops of all (if practical) "independent" (non-trivial) GPS vectors measured. Show vectors common to an observing session with different line types (dashed, dotted, etc., or other clear graphic depiction). Show, next to one or more of the independent lines for each session, the observing day number/session designation (e.g., 242B, 321C, 3331, 3332, etc.).

Survey points will be shown in an inset sketch when they are too close together to be depicted clearly on the network sketch. The project sketch(es) will be included with the project report.

9.0 PROJECT REPORT: The project report will be submitted in a binder with the project name on the front of the binder and will be structured in the following manner:

I. Introduction

A. Purpose - Describe the purpose for which the survey was conducted. Show the name of the organization for which the survey was performed.

B. Time Period - State the arrival and departure dates for the field crew
and dates of first and last observing sessions.

C. Point of Contact - Supply the name, phone number, and mailing address of the point of contact within the submitting organization. Supply the same information for all organizations which participated in the survey.

D. Accuracy standards - Provide the accuracy standards (vertical and horizontal) specified for the project.

II. Location - Describe the geographic location and scope of the project in general terms.

III. Conditions Affecting Progress - Specify equipment failures, climate, scope of project, site accessibility, reconnaissance, malfunctioning satellites, etc.

IV. Field Work

A. Chronology - Give a brief description of the progression of the project.

B. Instrumentation - Describe the make, model, and serial number of each receiver used on the project.

C. Deviation from Instructions - Describe any deviation from the procedures and specifications stated in the project instructions. Specify all stations which were eccentrically occupied and state why the station(s) could not be directly occupied.

V. Data Processing Performed - Describe the data processing that was done. Include tasks such as transferring of data to different storage media, data quality checking, station descriptions, vector determinations, and closure computations. Specify the ephemeris type [broadcast (predicted) or precise (post fit)] and the source.

Complete the following sections as appropriate:

A. Software Used - Specify all software by program name and version number which was used to acquire, manage, reduce, adjust, and submit field data. If the project data were reduced or acquired with different versions of a program, specify which version was used with which block of data.

B. Rejected Data - Specify observing sessions which were rejected and reobserved. Include the reason(s) why the data from a particular session were rejected.

C. Equipment - Describe by manufacturer, model number, and serial number all receivers used to collect the data. Indicate any equipment failures which may have degraded the quality of data and/or vector determinations which were retained. Specify the data or vectors by station and session, and the failed equipment by component and serial number. Indicate data rejected because of equipment failure in section B above.

D. Weather - Tabulate required meteorological observations for the survey and include a copy with this report. List all observing sessions which occurred during periods of changing or severe weather conditions such as passing fronts, storms, etc. A simple table listing the sessions influenced and the weather condition will suffice.

E. Adjustment - Discuss in detail the type(s) of adjustment(s) performed. Show weighting technique used, station(s) constrained, method used to estimate orthometric heights and existence of independent sub-networks. Discuss possible weaknesses or distortions found or suspected in the NGRS.

F. Closures - Tabulate the results of all loop misclosure computations. Include the vectors used, vector length, maximum closure error in each component, and average closure error in each component. Tabulate closure component error in terms of Cartesian coordinates (XYZ) and in terms of the local terrestrial system [N,E,U (north, east, up)]. Also, tabulate comparisons of repeat vectors observed indicating vector length, and maximum and average closure for each vector component. Closures will be stated in both meters and parts per million.

VI. Statistics

A. Stations Occupied - List station names and give total stations occupied based on each of the following categories:

1. Existent NGRS horizontal stations
2. Existent NGRS vertical stations
3. Existent NGRS horizontal/vertical stations
4. Stations established
5. Stations previously occupied with GPS

B. Base lines Observed - Compute the total number of independent (non-trivial) vectors observed during the project. Each observing session cannot have more than (N - 1) independent vectors, where N = number of receivers. For example, if a project included 10 observing sessions and 4 receivers were used during each session, a total of 10(4-1) = 30 independent vectors would have been observed.

C. Provide the total number of observing days and total number of sessions. For example, if the total number of observing days was 5 and there were 2 sessions conducted each observing day, then the total number of observing sessions was 5 x 2 = 10.

VII. Comments and Recommendations

Include noteworthy comments and recommendations regarding the execution of the GPS survey for this project (or future projects) not found elsewhere in the project report.

VIII. Attachments and Enclosures

A. Station List - Include a table which lists the station name, four-character station identifier, coordinates, elevation, session(s) occupied, and station type for all stations occupied. The list will be alphabetical by four-character identifier. See "Planning GPS Surveys" for instructions on preparation of station lists (NGS 1986).

B. Field Project Sketch - Attach a copy of the project sketch. If there are multiple copies of the sketch showing different data, attach a copy of each. See "Planning GPS Surveys" for instructions on preparation of survey sketches (NGS 1986).

C. Project Instructions - Attach a copy of the instructions and/or contract under which this project was performed. Also include any revisions or changes to the instructions or specifications.

D. Field Logs - Provide original or clear copies of field survey notes, record books, and observation logs. When appropriate, this will include Log of Time Offset Measurements and Log of Surface Meteorological Measurements.

E. Equipment Failure Logs - Include with the report a failure log for any equipment used to gather data which failed anytime during the project. The log will state the name of the component, serial number, date of failure and nature of failure.

F. Project Observing Schedule - Prepare a list which summarizes the following: observing day numbers/session letters, four-character station identifiers, start and stop dates and times (UTC), satellites observed (PRN numbers), receiver serial numbers, antenna offset measurements, remarks, etc.

All data and material submitted must be neat and legible (typed or clearly written in black ink). DO NOT SEND THE ONLY COPY OF ANY PAPER RECORDS OR DIGITAL DATA FILES.

10.0 PROJECT SUBMISSION CHECKLIST: Exhibit A is a form that may be used to check for completeness when submitting GPS project data to the National Geodetic Survey.

11.0 DATA TRANSMISSION MEDIA: **All** computer-generated digital data files must be submitted to the NGS in digital form on media approved by NGS at time of submission.

If you have questions concerning the above requirements, please contact:

Ms. Madeline White
National Geodetic Survey
NOAA, N/NGS42
1315 East-West Highway, Station 8432
Silver Spring, Maryland 20910-3282

Telephone: 301-713-3211, Ext. 188

EXHIBIT A

PROJECT SUBMISSION CHECKLIST
GPS PROJECTS

Project Title: _____

Accession Number: _____

Submitting Agency: _____

Observing Agency: _____

Receiver Type: _____

PACKAGE CONTENTS

Project Report and Attachments	**Required For**
( ) Project Report	All Projects
( ) **Approved Reconnaissance** and Project Sketch	All Projects
( ) Project Instructions or Contract Specifications	All Projects
( ) Final Station List	All Projects
( ) Station Visibility Diagrams	All Projects
( ) Final Observing Schedule	All Projects
( ) Observation Logs	All Projects
( ) Equipment Failure Logs	NGS Projects
( ) Loop Misclosures	**Optional**
( ) Free Adjustment **with Analysis**	All Projects
( ) Free Adjustment with Accuracies	**All Projects**
( ) Constrained Horizontal Adjustment	All Projects
( ) Constrained Vertical Adjustment (NAVD 88 Heights)	**All Projects**
( ) Meteorological Instrument Comparison Logs	If Specified
( ) Photographs of Views from Stations	If Specified
( ) Photographs or Rubbings of Station Marks	All Projects
( ) COMPGB Output (Validation program-B/G file)	All Projects
( ) OBSDES Output (Validation program-D-file)	All Projects
( ) OBSCHK Output (Validation program-D-file)	**All Projects**
( ) CHKDESC Output (Validation program-D-file)	**All Projects**
( ) ELLACC Output	**All Projects**
( ) BBACCUR Output	**All Projects**

Digitized Data Files **( ) Diskettes ( ) Other:**_____

( ) Raw Phase Data (R-files)	All Projects
( ) Base Line Vectors (G-file)	All Projects
( ) Project and Station Occupation Data(Final B-file)	All Projects
( ) Descriptions or Recovery Notes (D-file)	All Projects
( ) Terrestrial Horizontal Observations (T-file)	If Applicable
( ) Differential Leveling Observations (L-file)	If Applicable

Comments - Enter on the reverse side of this form.

Org Code **Name** **Date**

Received by: _____

Reviewed by: _____

Reviewed by: _____

REFERENCES:

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National Geodetic Survey, 1992: "Program DDPROC and Documentation," version 2.0: December 10, 1992.

National Geodetic Survey, 1991a: "Program LOOP and Documentation," version 4.03: January 18, 1991.

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Vincenty, T., 1987: "On the use of GPS vectors in densification adjustments," Surveying and Mapping (Journal of the American Congress on Surveying and Mapping), Vol. 47, No. 2, pp. 103-108.

NOTE: All National Geodetic Survey and Federal Geodetic Control Subcommittee publications are available from:

NOAA, National Geodetic Information Branch, N/NGS12
1315 East-West Highway, Room 9202
Silver Spring, MD 20910-3282.

phone: 301-713-3242
fax: 301-713-4172

ANNEX N

GLOBAL POSITIONING SYSTEM DATA TRANSFER FORMAT
(G-FILE)

This annex contains information about the Global Positioning System (GPS) Data Transfer Format (G-File) records. The G-File consists of eight 80-column record types that are used to document the results of the computation of relative vectors, expressed as components, from simultaneously observed GPS phase measurements. There may be only one G-file for a project. Each G-file must contain one Project Record (A) and one or more Session Header Records (B). A Session Header Record (B) is required for each individually processed vector or each simultaneously processed group of vectors (session) at three or more survey points. Each Session Header Record is followed by one or more Vector (C) and/or Long Vector (F) Records, Correlation (D) or Covariance (E) Records, optional Coordinate (G) Records, and optional and/or required Station Information (H) Records. Vector and Long Vector Records contain relative vector components between two survey points. Correlation Records contain the off-diagonal elements only of the correlation matrix for the vector components in a session. Covariance Records contain the off-diagonal elements only of the covariance matrix for the vector components in a session. The records for a simultaneously processed vector set may only contain correlation **or** covariance records but not a mix of the two. A Long Vector Record may only be used when a vector component is larger than +/- 999,999.9999 meters. The Coordinate (G) Records may be used to record, for informational purposes within the G-file, the coordinates of survey points held fixed during the vector computations or to provide location information regarding the G-file. Relative vectors are required even if coordinates are included. Station Information Records are used to document differing conditions or solution types for vectors within a session. The Station Information Record (H) is required only when an external time standard is used with a receiver, when a comment needs to be made about a station occupation, or when information about a station occupation or vector solution is not the same as for all other stations or vectors in a session. Multiple H records are allowed.

This annex documents the record formats, provides an explanation of the fields within each record, and gives G-file examples using the various record types.

CC-1 CODE	RECORD TYPE	
A	Project Record	**(The A record is required)**
B	Session Header Record	**(The B record is required)**
C	Vector Record	**(The C record is required)**
D	Correlation Record	**(Either the D record or the**
E	Covariance Record	**E record is required)**
F	Long Vector Record	
G	Coordinate/Absolute Position Record (optional)	
H	Station Information Record	

Project Record

01-01	A	
02-03	Job Code (Chapter 1)	Alpha
04-07	Year, Start of Project (local) (CCYY)	Integer
08-09	Month, Start of Project (local) (MM)	Integer
10-11	Day, Start of Project (local) (DD)	Integer
12-15	Year, End of Project (local) (CCYY)	Integer
16-17	Month, End of Project (local) (MM)	Integer
18-19	Day, End of Project (local) (DD)	Integer
20-78	Title of project	Alpha
79-80	Reserved	

Session Header Record

01-01	B		
02-05	Year, First Actual Measurement (UTC) (CCYY)		Integer
06-07	Month, First Actual Measurement (UTC) (MM)		Integer
08-09	Day, First Actual Measurement (UTC) (DD)		Integer
10-13	Time, First Actual Measurement (UTC) (HHMM)		Integer
14-17	Year, Last Actual Measurement (UTC) (CCYY)		Integer
18-19	Month, Last Actual Measurement (UTC) (MM)		Integer
20-21	Day, Last Actual Measurement (UTC) (DD)		Integer
22-25	Time, Last Actual Measurement (UTC) (HHMM)		Integer
26-27	Number of Vectors in the Session		Integer
28-42	Software Name & Version		Alpha
43-47	Orbit Source **(agency that computes orbit)**		Alpha
48-51	Orbit accuracy estimate **(XX.xx meters)**	Implied	Decimal
52-53	Solution coordinate system code	(table, N-6)	Integer
54-55	Solution meteorological use code	(table, N-6)	Integer
56-57	Solution ionosphere use code	(table, N-6)	Integer
58-59	Solution time parameter use code	(table, N-6)	Integer
60-60	Nominal accuracy code	(table, N-8)	Integer
61-66	Processing agency code	(Annex C)	Alpha
67-70	Year of Processing	(CCYY)	Integer
71-72	Month of processing	(MM)	Integer
73-74	Day of processing	(DD)	Integer
75-80	Solution Type	(table, N-7)	Alpha

Note: Columns 43 through 47 of Record B contains the symbol of the agency which computes and provides GPS satellite orbit information. Columns 61 through 66 contains the symbol of the agency that does the observation reduction processing. Columns 52 through 80 of Record B assume all stations use identical observing and computation procedures. If this is not the case use Record H to record the differences for each of those stations which vary from those conditions noted on the B record.

Vector Record

01-01	C		
02-05	Origin Station Serial Number (ssn) (vector tail)		Integer
06-09	Differential Station Serial Number (vector head)		Integer
10-20	Delta X	(XXXXXXX.xxxx meters)	Implied Decimal
21-25	Standard Deviation	(X.xxxx meters)	Implied Decimal
26-36	Delta Y	(XXXXXXX.xxxx meters)	Implied Decimal
37-41	Standard Deviation	(X.xxxx meters)	Implied Decimal
42-52	Delta Z	(XXXXXXX.xxxx meters)	Implied Decimal
53-57	Standard Deviation	(X.xxxx meters)	Implied Decimal
58-58	Rejection Code (use upper case R to reject)		Alpha
59-68	Origin Station Data Media Identifier		(See page N-6)
69-78	Differential Station Data Media Identifier		(See page N-6)
79-80	Reserved		

Note: Standard deviation values must be positive, non-zero numbers.

Correlation Record

01-01	D		
02-04	Row Index Number		Integer
05-07	Column Index Number		Integer
08-16	Correlation	(XX.xxxxxxx)	Implied Decimal
17-19	Row Index Number		Integer
20-22	Column Index Number		Integer
23-31	Correlation	(XX.xxxxxxx)	Implied Decimal
32-34	Row Index Number		Integer
35-37	Column Index Number		Integer
38-46	Correlation	(XX.xxxxxxx)	Implied Decimal
47-49	Row Index Number		Integer
50-52	Column Index Number		Integer
53-61	Correlation	(XX.xxxxxxx)	Implied Decimal
62-64	Row Index Number		Integer
65-67	Column Index Number		Integer
68-76	Correlation	(XX.xxxxxxx)	Implied Decimal
77-80	Reserved		

Note: This record is to record the off-diagonal correlates only from the session (or vector) correlation matrix. Since the correlation matrix is symmetric about the diagonal only the upper or the lower half should be recorded.

Covariance Record

01-01	E	
02-04	Row Index Number	Integer
05-07	Column Index Number	Integer
08-19	Covariance (XXXX.xxxxxxxx meters^2)	Implied Decimal
20-22	Row Index Number	Integer
23-25	Column Index Number	Integer
26-37	Covariance (XXXX.xxxxxxxx meters^2)	Implied Decimal
38-40	Row Index Number	Integer
41-43	Column Index Number	Integer
44-55	Covariance (XXXX.xxxxxxxx meters^2)	Implied Decimal
56-58	Row Index Number	Integer
59-61	Column Index Number	Integer
62-73	Covariance (XXXX.xxxxxxxx meters^2)	Implied Decimal
74-80	Reserved	

Note: This record is to record the off-diagonal covariances only from the vector variance-covariance matrix. The square root of the diagonal elements, the component standard deviations, are recorded on records C and F. Since the variance-covariance matrix is symmetric about the diagonal only the upper or the lower half should be recorded.

Long Vector Record

01-01	F	
02-05	Origin Station Serial Number (ssn) (vector tail)	Integer
06-09	Differential Station Serial Number (vector head)	Integer
10-22	Delta X (XXXXXXXXX.xxxx meters)	Implied Decimal
23-27	Standard Deviation (X.xxxx meters)	Implied Decimal
28-40	Delta Y (XXXXXXXXX.xxxx meters)	Implied Decimal
41-45	Standard Deviation (X.xxxx meters)	Implied Decimal
46-58	Delta Z (XXXXXXXXX.xxxx meters)	Implied Decimal
59-63	Standard Deviation (X.xxxx meters)	Implied Decimal
64-64	Rejection Code (use upper case R to reject)	Alpha
65-65	Origin station manufacturer code	(N-6)
66-68	Origin station UTC day of year of occupation (DDD)	Integer
69-69	Origin station year of occupation (Y) UTC	Integer
70-70	Origin station session indicator	Alpha
71-71	Differential station manufacturer code	(N-6)
72-74	Differential station day of year (DDD) UTC	Integer
75-75	Differential station year of occupation (Y) UTC	Integer
76-76	Differential station session indicator	Alpha
77-80	Reserved	

Note: Standard deviation values must be positive, non-zero numbers.

Coordinate Record

01-01	G	
02-02	Blank	
03-03	Record usage code K - see below	
04-05	Blank	
06-09	Station Serial Number	
10-10	Blank	
11-14	Optional "short" station name - see below	
15-15	Blank	
16-20	Coordinate frame designator (e.g. NAD 83, WGS 84, NAD 27, WGS 72, ITR 90, etc.; inquire for additions)	
21-21	Blank	
22-33	X coordinate (XXXXXXXX.xxxx meters)	Implied Decimal
34-34	Blank	
35-46	Y coordinate (YYYYYYYY.yyyy meters)	Implied Decimal
47-47	Blank	
48-59	Z coordinate (ZZZZZZZZ.zzzz meters)	Implied Decimal
60-60	Blank	
61-64	Sigma X (SS.ss m) blank if unknown or greater than 99.99 m	
65-65	Blank	
66-69	Sigma Y (SS.ss m) blank if unknown or greater than 99.99 m	
70-70	Blank	
71-74	Sigma Z (SS.ss m) blank if unknown or greater than 99.99 m	
75-80	Reserved	

K = 0 or blank indicates that the position is approximate and has no particular interpretation.
K = 1 indicates that these are exact coordinates (to 0.1 mm) used during the processing of the G-file vectors.

The 4 character "short" name, if used, should be the same abbreviation used elsewhere in the G-file or other related data files.

Station Information Record

01-01	H		
02-05	Station Serial Number (ssn)		Integer
06-09	Four Character Identifier		Alpha
10-11	External frequency standard code	(table, N-8)	
12-13	Vector meteorological use code	(table, N-6)	
14-15	Vector time parameter use code	(table, N-6)	
16-17	Vector ionosphere use code	(table, N-6)	
18-23	Vector Solution type	(table, N-7)	
24-78	Comments		Alpha
79-80	Reserved		

Use comment field to record clarifying information or instrument type if noted as "other" in Data Media Identifier.

CODE TABLES

Solution Coordinate Reference System Codes

01 -- WGS 72 Precise Ephemeris [DMA] Used from GPS beginning thru 1/3/87
02 -- WGS 84 Precise Ephemeris [DMA] from 1/4/87 thru 1/1/94
03 -- WGS 72 Broadcast Ephemeris [DOD] from GPS beginning thru 1/22/87
04 -- WGS 84 Broadcast Ephemeris [DOD] from 1/23/87 thru 6/28/94
05 -- ITRF 89 Epoch 1988.0 (International Earth Rotation Service
NOT USED AS A GPS REFERENCE FRAME
06 -- NEOS 91.25 Epoch 1988 [NGS] from Spring 1991 thru 10/19/91
SPECIAL VLBI COORDINATE SOLUTION written by Mike Abell
07 -- NEOS 90 Epoch 1988.0 [NGS] from 10/20/91 thru 8/15/92
08 -- ITRF 91 Epoch 1988.0 [NGS] from 8/16/92 thru 12/19/92
09 -- SIO/MIT 1992.57 Epoch 1992.57 [NGS] from 12/20/92 thru 11/30/93
10 -- ITRF 91 Epoch 1992.6 [NGS] from 12/1/93 thru 1/8/94
11 -- ITRF 92 Epoch 1994.0 [NGS] from 1/9/94 thru 12/31/95
12 -- ITRF 93 Epoch 1995.0 [NGS] from 1/1/95 thru 6/29/96
13 -- WGS 84 (G730) Epoch 1994.0 [DMA] from 1/2/94 thru 9/28/96
14 -- WGS 84 (G730) Epoch 1994.0 Broadcast [DOD USAF] from 6/29/94 thru 1/28/97
15 -- ITRF 94 Epoch 1996.0 [NGS] from 6/30/96 thru 2/28/98
16 -- WGS 84 (G873) Epoch 1997.0 [NIMA] (formerly DMA) from 9/29/96 to the present
17 -- WGS 84 (G873) Epoch 1997.0 Broadcast [DOD USAF] from 1/29/97 to the present
18 -- ITRF 96 Epoch 1997.0 [NGS] from 3/1/98 to 7/31/99
19 -- ITRF 97 Epoch 1997.0 [NGS] from 8/01/99 to the present

Solution Meteorological Use Codes

01 -- Default values used (model used)
02 -- Observed meteorological data used
03 -- Water vapor radiometer used

Solution Ionosphere Use Code

01 -- None
02 -- Dual frequency ionospheric correction used
03 -- Ionospheric model used

Solution Time Parameter Use Codes

01 -- Observed time synchronization data used
02 -- Time parameters solved for in data reduction

Data Media Identifier

Required format: ADDDYSCCCC

where, A is one of the following characters which indicates the manufacturer of the receiver used for the observation:
A = Ashtech, Inc; C = Topcon Corp; D = Del Norte Technology, Inc;
E = Magellan; G = Allen Osborne; I = Istac; J = Javad Position Systems;
K = Sokkia; L = MINI-MAC^{R}; M = MACROMETER^{R}; N = Norstar Instruments;
O = Motorola, Inc; P = Spectra Precision; Q = 3S Navigation;
R = Trimble Navigation Ltd.; S = SERCEL, Inc; T = Texas Instruments;
V = NovAtel Communications Ltd; W = Wild, Leica, Magnavox; X = other

DDD is the day of the year of the first data epoch (UTC)
Y is the last digit of the year of the first data epoch (UTC)
S is an alphanumeric designation of the session
CCCC is the project unique, four character abbreviation of a station designation

CODE TABLES (continued)

Solution Type Use Codes

+ L1TD--	L1SDFL	L1DDFL	IFDDFL	OTDDFL	K1DDFX
+ L2TD--	L1SDFX	L1DDFX	IFDDFX	OTDDFX	K2DDFX
+ IFTD--	L1SDPF	L1DDPF	IFDDPF	OTDDPF	KIDDFX
+ WLTD--					KWDDFX
		L2DDFL	WLDDFL		P1DDFX
		L2DDFX	WLDDFX		P2DDFX
		L2DDPF	WLDDPF		PIDDFX
					PWDDFX

Where: L1 = Frequency 1
L2 = Frequency 2
IF = Ionosphere Free Combination (Static) *
WL = Wide Lane Combination (Static or Rapid Static)**
OT = Other (Explain in Station Information Record)

K1 = L1 Kinematic Observation (Single visit, continuous lock - also known as Continuous Kinematic, Stop and Go Kinematic, or On-the-Fly Kinematic)
K2 = L2 Kinematic
KI = Ionosphere Free Combination Kinematic *
KW = Wide Lane Combination Kinematic **

P1 = L1 Pseudo-kinematic (Two or more visits, intermittent lock - also known as Pseudo-static, Intermittent Static or Reoccupation techniques)
P2 = L2 Pseudo-kinematic
PI = Ionosphere Free Combination Pseudo-kinematic *
PW = Wide Lane Combination Pseudo-kinematic **

TD = Triple Difference Solution
DD = Double Difference Solution
SD = Single Difference Solution

FL = Float (real number) estimate of biases
FX = Fixed integer estimate of biases
PF = Partial, fixed integer estimate of biases (Not all integer biases determinable).

+ Triple Difference Solutions have no integer ambiguities, leave trailing columns blank.
* IF = ionosphere free = $\{f^2_1/(f^2_1 - f^2_2)\}L_1 - \{f_1 f_2/(f^2_1 - f^2_2)\}L_2$
** WL = wide lane = L1 - L2

Where, f_1 = 1575.42 mHz, f_2 = 1227.60 mHz, and L_1 and L_2 are phase measurements in units of cycles.

CODE TABLES (continued)

External Frequency Standard

01 -- No external frequency standard used
02 -- Rubidium frequency standard used
03 -- Cesium frequency standard used
04 -- Hydrogen Maser frequency standard used
05 -- External crystal frequency standard used
06 -- Other (Comment in Station Information Record)

Vector Nominal Accuracy Codes

		Order/Class
4 -- Intended accuracy	100 ppm plus 5.0 cm	3
3 -- Intended accuracy	50 ppm plus 3.0 cm	2-II
2 -- Intended accuracy	20 ppm plus 2.0 cm	2-I
5 -- Intended accuracy	10 ppm plus 1.0 cm	1
6 -- Intended accuracy	1 ppm plus 0.8 cm	B
7 -- Intended accuracy	0.1 ppm plus 0.5 cm	A
8 -- Intended accuracy	0.01 ppm plus 0.3 cm	AA

PROJECT RECORD

```
 1     2 3   4             11  12             19 20
+),   +)0), +)0)0)0)0)0)0)0),  +)0)0)0)0)0)0)0), +)))))))))))))))))))))))))))))))))))))),
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RECORD JOB   C C Y Y M M D D    C C Y Y M M D D                PROJECT TITLE
TYPE  CODE       START               END
(A)             PROJECT             PROJECT
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     +)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),   +)0),
     .)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))-   .)2)-
                                PROJECT TITLE CONTINUED
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GROUP HEADER RECORD

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 1     2             9    10     13     14             21  22     25
+),   +)0)0)0)0)0)0)0),   +)0)0)0),     +)0)0)0)0)0)0)0),  +)0)0)0),
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RECORD C C Y Y M M D D     H H M M       C C Y Y M M D D    H H M M
TYPE   DATE OF FIRST     TIME OF FIRST    DATE OF LAST    TIME OF LAST
(B)     OBSERVATION       OBSERVATION     OBSERVATION     OBSERVATION

26 27   28                            42 43       47  48       51      52 53        54 55
+)0),   +)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0), +)0)0)0)0),  +)0)0), +),      +)0),        +)0),
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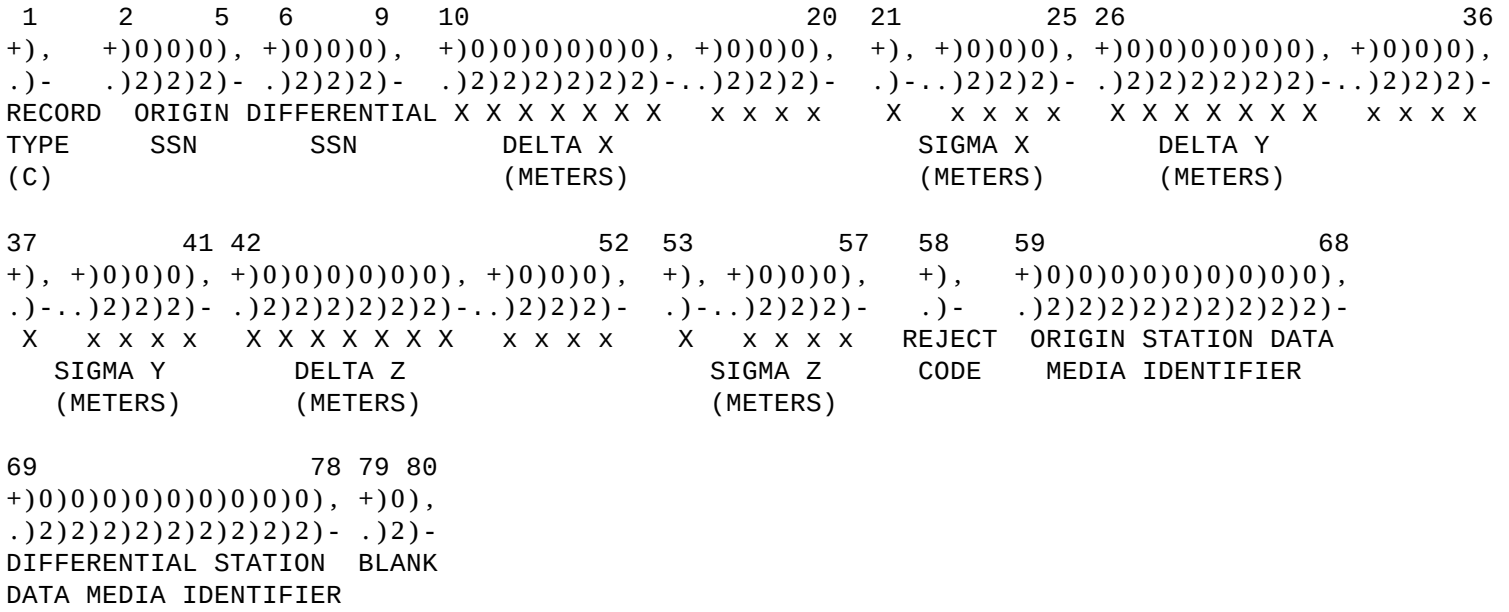
NUMBER           SOFTWARE ID               ORBIT      X X X   x       COORDINATE    MET.
  OF             AND VERSION               SOURCE    ORBIT ACCURACY   SYSTEM        USE
VECTORS                                               (METERS)       CODE          CODE

56 57         58 59         60     61         66 67             74  75         80
+)0),         +)0),         +),    +)0)0)0)0)0), +)0)0)0)0)0)0)0),  +)0)0)0)0)0),
.)2)-         .)2)-         .)-    .)2)2)2)2)2)- .)2)2)2)2)2)2)2)-  .)2)2)2)2)2)-
IONOSPHERE  TIME PARAMETER  ACCURACY   PROCESSING   C C Y Y M M D D      SOLUTION
USE CODE       CODE          CODE       AGENCY     PROCESSING DATE        CODE
```

VECTOR RECORD



CORRELATION RECORD

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 1      2   4   5   7   8                 16  17   19 20   22 23                 31 32   34
+),    +)0)0), +)0)0), +)0), +)0)0)0)0)0)0),  +)0)0), +)0)0), +)0), +)0)0)0)0)0)0), +)0)0),
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RECORD   ROW   COLUMN   X X   x x x x x x x     ROW   COLUMN   X X   x x x x x x x    ROW
TYPE    INDEX  INDEX       CORRELATION         INDEX  INDEX      CORRELATION         INDEX
(D)      NO.    NO.                             NO.    NO.                             NO.

35   37 38                 46  47   49 50   52 53                 61 62   64 65   67
+)0)0), +)0), +)0)0)0)0)0)0), +)0)0), +)0)0), +)0), +)0)0)0)0)0)0), +)0)0), +)0)0),
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COLUMN   X X   x x x x x x x     ROW   COLUMN   X X   x x x x x x x    ROW   COLUMN
INDEX       CORRELATION         INDEX  INDEX       CORRELATION        INDEX  INDEX
 NO.                             NO.    NO.                             NO.    NO.

68                 76 77     80
+)0), +)0)0)0)0)0)0), +)))))),
.)2)-..)2)2)2)2)2)- .)))))))-
 X X   x x x x x x x     BLANK
     CORRELATION
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COVARIANCE RECORD

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 1      2   4   5   7   8                        19  20   22 23   25
+),    +)0)0), +)0)0), +)0)0)0), +)0)0)0)0)0)0)0),  +)0)0), +)0)0),
.)-    .)2)2)- .)2)2)- .)2)2)2)-..)2)2)2)2)2)2)-  .)2)2)- .)2)2)-
RECORD   ROW   COLUMN   X X X X   x x x x x x x x     ROW   COLUMN
TYPE    INDEX  INDEX        COVARIANCE                INDEX  INDEX
(E)      NO.    NO.         (METERS²)                 NO.    NO.

26                       37 38   40 41   43 44                        55 56   58 59   61
+)0)0)0), +)0)0)0)0)0)0)0), +)0)0), +)0)0), +)0)0)0), +)0)0)0)0)0)0)0), +)0)0), +)0)0),
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 X X X X   x x x x x x x x    ROW   COLUMN   X X X X   x x x x x x x x    ROW   COLUMN
      COVARIANCE              INDEX  INDEX        COVARIANCE              INDEX  INDEX
      (METERS²)               NO.    NO.         (METERS²)               NO.    NO.

62                       73 74     80
+)0)0)0), +)0)0)0)0)0)0)0), +)))))))),
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 X X X X   x x x x x x x x    BLANK
      COVARIANCE
      (METERS²)
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LONG VECTOR RECORD

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 1      2     5    6     9    10                          22  23         27
+),    +)0)0)0),  +)0)0)0),   +)0)0)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0),
.)-    .)2)2)2)-  .)2)2)2)-   .)2)2)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)-
RECORD   ORIGIN  DIFFERENTIAL  X X X X X X X X   x x x x    X   x x x x
TYPE      SSN        SSN                 DELTA X              SIGMA X
(F)                                     (METERS)             (METERS)


28                          40 41         45  46                          58  59         63
+)0)0)0)0)0)0)0)0), +)0)0)0), +), +)0)0)0),  +)0)0)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0),
.)2)2)2)2)2)2)2)2)-..)2)2)2)- .)-..)2)2)2)-  .)2)2)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)-
 X X X X X X X X   x x x x   X   x x x x    X X X X X X X X   x x x x    X   x x x x
            DELTA Y             SIGMA Y                 DELTA Z             SIGMA Z
            (METERS)            (METERS)                (METERS)            (METERS)


64       65    66       70   71    72       76     77  80
+),      +),   +)0)0)0)0),   +),   +)0)0)0)0),     +)))),
.)-      .)-   .)2)2)2)2)-   .)-   .)2)2)2)2)-     .))))-
REJECT  ORIG    D D D Y S    DIFF   D D D Y S       BLANK
CODE    INST    ORIGIN DAY   INST  DIFFERENTIAL
        CODE    IDENTIFIER   CODE   IDENTIFIER
```

COORDINATE RECORD (Optional)

```
 1        2    3    4 5    6     9   10   11     14  15   16       20   21
+),      +),  +),  +)0),  +)0)0)0),  +),  +)0)0)0),  +),  +)0)0)0)0),  +),
.)-      .)-  .)-  .)2)-  .)2)2)2)-  .)-  .)2)2)2)-  .)-  .)2)2)2)2)-  .)-
RECORD  BLANK  K   BLANK   STATION  BLANK   SHORT   BLANK COORDINATE  BLANK
TYPE         (0,1)         SERIAL           NAME          FRAME
(G)                        NUMBER                         DESIGNATOR


22                       33  34    35                        46  47
+)0)0)0)0)0)0)0), +)0)0)0),  +),   +)0)0)0)0)0)0)0), +)0)0)0),  +),
.)2)2)2)2)2)2)-..)2)2)2)-  .)-   .)2)2)2)2)2)2)-..)2)2)2)-  .)-
 X X X X X X X   x x x x  BLANK   Y Y Y Y Y Y Y   y y y y  BLANK
   X COORDINATE  (METERS)            Y COORDINATE  (METERS)


48                       59  60   61       64  65   66       69  70   71       74  75 80
+)0)0)0)0)0)0)0), +)0)0)0),  +),  +)0), +)0),  +),  +)0), +)0),  +),  +)0), +)0),  +))),
.)2)2)2)2)2)2)-..)2)2)2)-  .)-  .)2)-..)2)-  .)-  .)2)-..)2)-  .)-  .)2)-..)2)-  .)))-
 Z Z Z Z Z Z Z Z   z z z z  BLANK   SIGMA X   BLANK   SIGMA Y   BLANK   SIGMA Z    BLANK
    Z COORDINATE  (METERS)          (METERS)          (METERS)          (METERS)
```

STATION INFORMATION RECORD

```
 1      2     5   6     9    10 11   12 13   14 15   16 17   18         23
+),    +)0)0)0), +)0)0)0),   +)0),   +)0),   +)0),   +)0),   +)0)0)0)0)0),
.)-    .)2)2)2)- .)2)2)2)-   .)2)-   .)2)-   .)2)-   .)2)-   .)2)2)2)2)2)-
RECORD  STATION    FOUR       EXT.    MET.   TIME     ION.      SOLUTION
TYPE    SERIAL   CHARACTER    FREQ.   USE    PARAM.   USE         TYPE
(H)     NUMBER   IDENTIFIER   CODE    CODE   CODE     CODE


24                                                                                                                  78
+)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0),
.)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)2)-
     COMMENT FIELD

79 80
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```

G-FILE EXAMPLES

Below are fragments from six independent, simulated GPS Data Transfer Format files (G-FILEs). There is one Project record (A) per G-file. Each session vector set, or individually computed vector in a multi-receiver session, requires a Session Record (B). Each vector requires at least one Vector Record (C) or Long Vector Record (F). Vector Records with Coordinate Records must follow the same Session Record. Station Information (H) Records are required as circumstances dictate and may be optionally added where not required. These records must be followed by sufficient Correlation (D) or Covariance Records (E) to express all off-diagonal correlation or covariance terms in the matrix half provided from the session computation. Correlation and Covariance Records may not be intermixed.

1. Project (A), Session (B), Vector (C), and Correlation (D) records for a single vector between two stations in a two receiver session or individually computed vector in a multi-receiver session.

```
AKS1989061619890810
B1989062221041989062300320 1OMNI21JUL89    BDCST200040101025NGS    19890919L1DDFX
C02860255   22818804  691  517712752 1665  621497962 1259 M1739APACIM1739AK60A
D  1  2 -1507832  1  3 -1653265  2  3 -9400487
```

2. Project (A), Session (B), Vector (C), and Correlation (D) records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AA21989061619890810
B1989071919201989071920220 20MNI21JUL89    NSWC  200020202026NGS   19891010IFDDFL
C02520251    2090836   21    3595939   80    5412122   45 T1735BTOLPT1735BIO35
C02520250  -42878920   42  -19024426   93  -28455946   69 T1735BTOLP71735BIO17
D  1  2 -3449463  1  3  -169254  1  4 -7443040  1  5 -3452654  1  6  1753975
D  2  3 -7698120  2  4 -6329835  2  5  1258498  2  6  8573493  3  4 -6485385
D  3  5 -6084380  3  6  -477478  4  5 -6124087  4  6 -3864367  5  6  8630812
```

Note: If a multi-receiver session is computed as if all possible vectors are independent, then there would be Session, Vector, and Correlation records for each vector in the session. Thus, the record sequence would be A, B, C, D, B, C, D, B, C, D, etc. The Session records would be nearly identical to the multi-receiver example except that start and stop times could vary with each vector. The number of vectors indicated on each Session Record would be one, i.e., there would be a Session Record for each vector and the cross correlation terms between vectors would not exist.

3. Project (A), Session (B), Vector (C), and Correlation (D) Records for a five-receiver (four vector) session computed simultaneously in session mode.

```
AW11989061619890810
B19890718192419890718225204OMNI21JUL89    BDCST 200020202025NGS   19891003L1DDFL
C03000287    5764741   77    1459095   44    2345097   54 R1765ASMILR1765ANEOP
C03000223  -52521873   47    -229406  101   -1142670   75 R1765ASMILR1765ACESZ
C03000305  -42878920   42  -19024426   93  -28455945   69 R1765ASMILR1765AX042
C03000240    7097171   69   -1171456   40   -1443438   46 R1765ASMILR1765AG042
D  1  2 -7621157  1  3 -6268111  1  4  1032188  1  5 -7397468  1  6  2749723
D  1  7 -7716473  1  8 -6339150  1  9  1294594  1 10 -2396473  1 11 -2753742
D  1 12 -5804898  2  3  -791184  2  4 -6108347  2  5 -1739462  2  6  9010327
D  2  7 -7729301  2  8 -6463718  2  9  1526641  2 10 -3826492  2 11  3610736
D  2 12 -6449538  3  4   170894  3  5 -6299216  3  6 -1003847  3  7 -5307149
D  3  8 -7680811  3  9 -6477668  3 10  1506536  3 11 -9537262  3 12 -1836426
D  4  5 -6154878  4  6  -248020  4  7 -6087715  4  8 -1633847  4  9  6354725
D  4 10 -7804602  4 11 -6047825  4 12  1262026  5  6  3746287  5  7 -7243634
D  5  8 -6110139  5  9  -321344  5 10 -6165227  5 11  8362528  5 12  9162533
D  6  7 -5971690  6  8  -516393  6  9 -6136978  6 10 -9354622  6 11  1535474
D  6 12 -5920223  7  8  -559594  7  9 -6153794  7 10  2645373  7 11 -5373742
D  7 12 -5527744  8  9 -7793107  8 10  1043462  8 11  5378213  8 12 -2564522
D  9 10 -5371777  9 11 -7908942  9 12  1046883 10 11  8354256 10 12 -3372634
D 11 12  7153372
```

4. Project (A), Session (B), Vector (C), and Covariance (E) Records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AC51989061619890810
B19890719192019890719202202OMNI21JUL89    NSWC  200020202026NGS   19891010WLDDPF
C02520251    2090836   21    3595939   80    5412122   45 T1735BTOLPT1735BIO35
C02520250  -42878920   42  -19024426   93  -28455946   69 T1735BTOLPT1735BIO17
E  1  2    -3449231  1  3     169013  1  4    -7443219  1  5    -3452017
E  1  6    -1753648  2  3    7698884  2  4    -6329438  2  5     1258689
E  2  6     8573027  3  4   -6485903  3  5    -6084227  3  6     -477369
E  4  5     6124824  4  6   -3864711  5  6     8630682
```

5. Project (A), Session (B), Long Vector (F), and Correlation (D) Records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AM31989061619890810
B19900312192019900312202203OMNI21JUL89    NSWC  200050202027NGS  19900605IFDDPF
F02520251  -7398138095   62   -611028070  140   -759539795   81 R0710AR0710A
F02520210 -28097365450    2   6537703840    2   1612488880    2 R0710AR0710A
D  1  2 -3449463  1  3  -169254  1  4 -7443040  1  5 -3452654  1  6  1753975
D  2  3 -7698120  2  4 -6329835  2  5  1258498  2  6  8573493  3  4 -6485385
D  3  5 -6084380  3  6  -477478  4  5 -6124087  4  6 -3864367  5  6  8630812
```

6. Project (A), Session (B), Vector (C), Coordinate (G), Station Information (H), and Correlation (D) Records for a five-receiver session computed simultaneously.

```
AG41989061619890810
B199210191620199210192022O4OMNI06JAN93    NGS    50090202027NGS   19930115IFDDFX
C02520251 -121666909   30  157350726   56  117976050   41 R2932ANORDR2932ASECO
C02520250 -418472429   32  247232117   60    8372071   44 R2932ANORDR2932ABURR
C02520253 -553950607   35  500052515   64  221106176   48 R2932ANORDR2932AFIGU
C02520254 -289152973   31  300310186   55  183697838   42 R2932ANORDR2932APINE
G 1  0252 NORD SIO92 -25711011350 -45925184360  35928923390  010  010  010
H0252NORD01020202IFDDFXREFERENCE STATION
D  1  2 -7621157  1  3 -6268111  1  4  1032188  1  5 -7397468  1  6  2749723
D  1  7 -7716473  1  8 -6339150  1  9  1294594  1 10 -2396473  1 11 -2753742
D  1 12 -5804898  2  3  -791184  2  4 -6108347  2  5 -1739462  2  6  9010327
D  2  7 -7729301  2  8 -6463718  2  9  1526641  2 10 -3826492  2 11  3610736
D  2 12 -6449538  3  4   170894  3  5 -6299216  3  6 -1003847  3  7 -5307149
D  3  8 -7680811  3  9 -6477668  3 10  1506536  3 11 -9537262  3 12 -1836426
D  4  5 -6154878  4  6  -248020  4  7 -6087715  4  8 -1633847  4  9  6354725
D  4 10 -7804602  4 11 -6047825  4 12  1262026  5  6  3746287  5  7 -7243634
D  5  8 -6110139  5  9  -321344  5 10 -6165227  5 11  8362528  5 12  9162533
D  6  7 -5971690  6  8  -516393  6  9 -6136978  6 10 -9354622  6 11  1535474
D  6 12 -5920223  7  8  -559594  7  9 -6153794  7 10  2645373  7 11 -5373742
D  7 12 -5527744  8  9 -7793107  8 10  1043462  8 11  5378213  8 12 -2564522
D  9 10 -5371777  9 11 -7908942  9 12  1046883 10 11  8354256 10 12 -3372634
D 11 12  7153372
```

ANNEX O

GRAVITY CONTROL FORMULAS
DEPARTMENT OF DEFENSE GRAVITY LIBRARY

Formulas Used in Computing Free-Air and Bouguer Anomalies

1. Symbology

Symbol	Definition	Units
g	Free-Air Anomaly	milligals
g	Bouguer Anomaly	milligals
ϕ	Latitude of Observation	degrees, minutes
γ	Theoretical Gravity	milligals
g	Observed Gravity	milligals
h	Elevation (Col 23-29) of surface of land, ice or water; depth of ocean, (positive downward) elevation types 3, 4, and 5. + = above SL; - = below SL.	meters
d	Supplemental Elevation (Col 31-35) = Depth of Ocean, lake, ice or instrument (positive downward)	meters

2. Theoretical Gravity Computation

Using the International Gravity Formula 1967

$$\gamma = C_1 (1 + C_2 \sin^2 \phi + C_3 \sin^4 \phi)$$

where: $C_1 = 978031.85$ mgals

$C_2 = 0.005278895$

$C_3 = 0.000\ 023462$

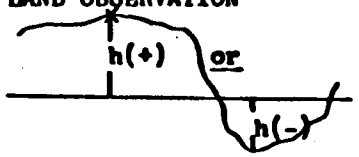
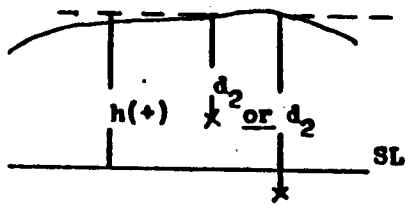
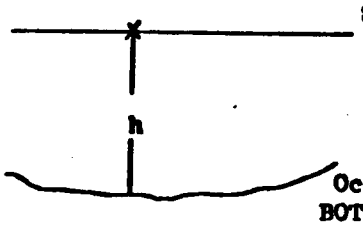
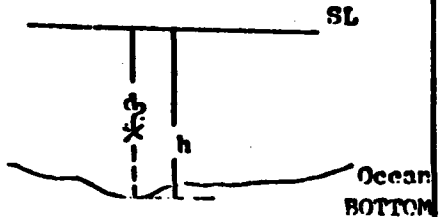
3. Anomaly Computations

b = Bouguer Correction Factor
= $2\pi K\rho = 0.04191\rho$

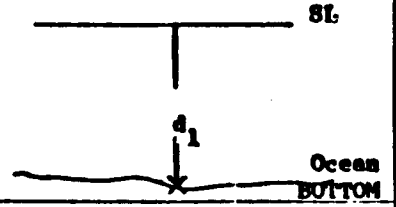
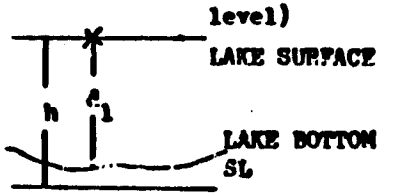
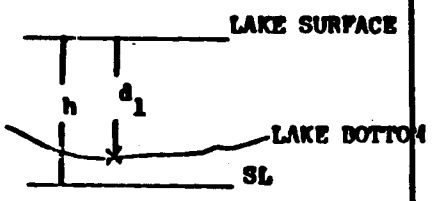
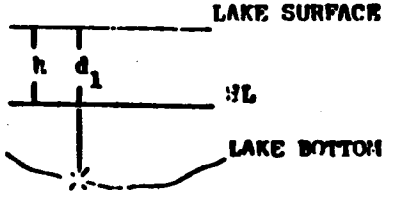
ρ = Density Used in Computations

Substance	ρ	$b = 2\pi K\rho$
Fresh Water	1.0	0.04191
Salt Water	1.027	0.04304
Ice	0.917	0.03843
Land	2.67	0.1119
Land-Fresh Water	1.67	0.06999
Land-Salt Water	1.643	0.06886
Land and Ice	1.753	0.07347

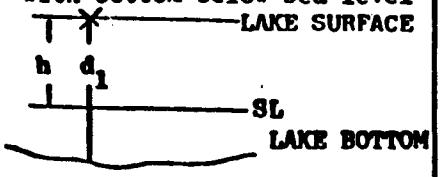
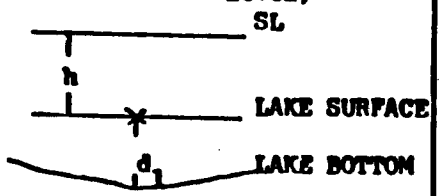
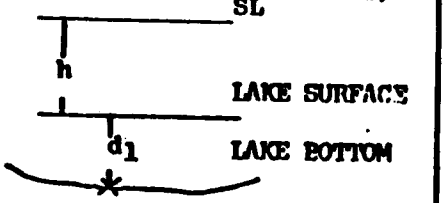
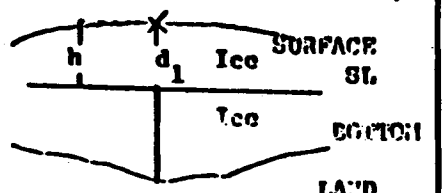
ANOMALY COMPUTATION CHART (p. 1)

Elev. Type Col. 21	SITUATION	FREE-AIR ANOMALY COMPUTATION	BOUGUER ANOMALY COMPUTATION
1	LAND OBSERVATION 	$\Delta g_f = g + 0.3086h - \gamma$	$\Delta g_B = \Delta g_f - 0.1119h$
2	SUBSURFACE 	$\Delta g_f = g + 0.2238d_2 + 0.3086(h-d_2) - \gamma$ NOTE: d_2 = depth of instrument	$\Delta g_B = \Delta g_f - 0.1119h$
3	OCEAN SURFACE 	$\Delta g_f = g - \gamma$	$\Delta g_B = \Delta g_f + 0.06886h$ NOTE: h = depth of ocean positive downward from surface
h	OCEAN SUBMERGED 	$\Delta g_f = g - 0.2225d_2 - \gamma$ NOTE: d_2 = depth of instrument positive downward	$\Delta g_B = \Delta g_f + 0.06886h$ NOTE: h = depth of ocean positive downward

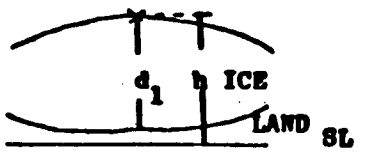
ANOMALY COMPUTATION CHART (p. 2)

Elev. Type Col.21	SITUATION	FREE-AIR ANOMALY COMPUTATION	BOUGUER ANOMALY COMPUTATION
5	OCEAN BOTTOM 	$\Delta g_f = g - 0.2225d_1 - \gamma$ NOTE: d_1 = depth of ocean positive downward	$\Delta g_B = \Delta g_f + 0.06886d_1$
6	LAKE SURFACE (above sea level) 	$\Delta g_f = g + 0.3086h - \gamma$	$\Delta g_B = \Delta g_f - 0.04191d_1 - 0.1119(h-d_1)$ NOTE: d_1 = depth of lake positive downward
7	LAKE BOTTOM (above sea level) 	$\Delta g_f = g + 0.08382d_1 + 0.3086(h-d_1) - \gamma$	$\Delta g_B = \Delta g_f - 0.04191d_1 - 0.1119(h-d_1)$
8	LAKE BOTTOM (below sea level) 	$\Delta g_f = g + 0.08382d_1 + 0.3086(h-d_1) - \gamma$	$\Delta g_B = \Delta g_f - 0.04191h - 0.06999(h-d_1)$

ANOMALY COMPUTATION CHART (p. 3)

Elev. Type Col. 21	SITUATION	FREE-AIR ANOMALY COMPUTATION	BOUGUER ANOMALY COMPUTATION
9	LAKE SURFACE (above sea level) with bottom below sea level 	$\Delta g_f = g + 0.3086h - \gamma$	$\Delta g_B = \Delta g_f - 0.04191h - 0.06999(h-d_1)$
A	LAKE SURFACE (below sea level) 	$\Delta g_f = g + 0.3086h - \gamma$	$\Delta g_B = \Delta g_f - 0.1119h + 0.06999d_1$ NOTE: d_1 = depth of lake positive downward
B	LAKE BOTTOM (surface below sea level) 	$\Delta g_f = g + 0.3086h - 0.2248d_1 - \gamma$ NOTE: d_1 = depth of lake positive downward	$\Delta g_B = \Delta g_f - 0.1119h + 0.06999d_1$
C	ICE CAP (bottom below sea level) 	$\Delta g_f = g + 0.3086h - \gamma$	$\Delta g_B = \Delta g_f - 0.03843h - 0.07347(h-d_1)$ NOTE: d_1 = depth of ice positive downward

ANOMALY COMPUTATION CHART (p. 4)

Elev. Type Col. 21	SITUATION	FREE-AIR ANOMALY COMPUTATION	BOUGUER ANOMALY COMPUTATION
D	ICE CAP (bottom above sea level) 	$\delta g_f = g + 0.3086h - Y$	$\delta g_B = \delta g_f - 0.03843d_1 - 0.1119(h-d_1)$ NOTE: d_1 = depth of ice